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DOCUMENT 360-82

AD A123424

KWAJALEIN MISSILE RANGE
KWAJALEIN, MARSHALL ISLANDS

RANGE REFERENCE ATMOSPHERE
0-70 KM ALTITUDE

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METEOROLOGY GROUP
RANGE COMMANDERS COUNCIL

WHITE SANDS MISSILE RANGE
KWAJALEIN MISSILE RANGE
YUMA PROVING GROUND

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER Document 360-82	2. GOVT ACCESSION NO. AD-A123424	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Range Reference Atmosphere 0-70 KM Altitude Kwajalein Missile Range, Kwajalein, Marshall Islands		5. TYPE OF REPORT & PERIOD COVERED 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Meteorology Group Range Commanders Council White Sands Missile Range, NM 88002		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Same as Block 7.		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS Secretariat, Range Commanders Council ATTN: STEWS-SA-R White Sands Missile Range, NM 88002		12. REPORT DATE 13. NUMBER OF PAGES 185
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office) Same as Block 11.		15. SECURITY CLASS. (of this report) UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES Supersedes Document 104-63, "Reference Atmosphere (Part 1), Kwajalein Missile Range, Kwajalein, Marshall Islands," ADA002664.		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Range reference atmosphere, data quality control, wind statistics and models, computation of statistical parameters, orthogonal axes, data samples, required altitude levels, monthly mean and annual mean, thermodynamics quantities.		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) FOREWORD (See attached.)		

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KWAJALEIN MISSILE RANGE
KWAJALEIN, MARSHALL ISLANDS
RANGE REFERENCE ATMOSPHERE
0-70 km ALTITUDE

Prepared by

Range Reference Atmosphere Committee
Meteorology Group
Range Commanders Council

Published by

Secretariat
Range Commanders Council
White Sands Missile Range, New Mexico 88002

APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED

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LIST OF ORGANIZATION ACRONYMS

AD	Armament Division
AFFTC	Air Force Flight Test Center
AFSC	Air Force Systems Command
AFSC/AFGL	AFSC/Air Force Geophysics Laboratory
AFSCF	Air Force Satellite Control Facility
AFTFWC	Air Force Tactical Fighter Weapons Center
AWS	Air Weather Service
BMD	Ballistic Missile Division
DOD	Department of Defense
DOE	Department of Energy
DOE/NTS	DOE/Nevada Test Site
DPG	Dugway Proving Ground
ESMC	Eastern Space and Missile Center
ETR	Eastern Test Range
KMR	Kwajalein Missile Range
NASA	National Aeronautics and Space Administration
NASA/MSFC	NASA/Marshall Space Flight Center
NASA/WFC	NASA/Wallops Flight Center
NOAA	National Oceanic and Atmospheric Administration
NWC	Naval Weapons Center
PMTC	Pacific Missile Test Center
SAMTO	Space and Missile Test Organization
USA/DTA	U.S. Army/Deseret Test Center
USAECOM	U.S. Army Electronics Command
USAFETAC	United States Air Force Environmental Technical Applications Center

UTTR	Utah Test and Training Range
WSMC	Western Space and Missile Center
WSMR	White Sands Missile Range
WTR	Western Test Range
YPG	Yuma Proving Ground
6585TG	6585th Test Group
TSCF	Targeting Systems Characterization Facility

FOREWORD

Atmospheric parameters are essential to the research and development of missiles and aerospace vehicles. The need for realistic atmospheric models derived in a consistent manner for each of the several major test ranges was recognized in the early 1960's. An atmospheric model which is derived from statistical data for a particular geographical location is referred to as a reference atmosphere.

Following the first Range Reference Atmosphere (RRA) by the Inter-Range Instrumentation Group (IRIG) for Cape Kennedy, Florida, issued in 1963 and additional publications for several ranges up to 1974, improved upper-air data bases have become available from which to develop the RRA. This is the result of the extended period of records and improvement in the upper-air measuring program by rocketsondes for altitudes above the rawinsonde ceiling of 30 km altitude. Revised and improved RRAs are justified because:

1) Needs for more definitive statistical atmospheric models have arisen due to changes and advances in aerospace technology. The Space Transportation System (Space Shuttle) is one example.

2) There is now an extended and improved upper-air data base for most ranges from which to develop a more definitive RRA.

3) There are requirements for RRAs for new ranges and range sites.

4) There have been scientific advances in understanding the upper atmospheric structure and physical relationships.

5) Advances in statistical modeling techniques have been made due to the general availability of high-speed electronic computers. This has led to the adoption of advanced concepts in atmospheric modeling. For these reasons the Range Reference Atmosphere Committee (RRAC) was tasked by the Range Commander's Council/Meteorology Group (RCC/MG) to establish new and improved RRAs. The purpose, scope, and objectives of this task are:

Range Reference Atmospheres

Purpose: This committee, Task MG-1, establishes RRAs for the several ranges as provided by the RCC. An RRA is a model of the Earth's atmosphere over a geographical location of interest for use by DOD and other U.S. Government range users. The RRA is used to provide planning data for evaluating environmental constraints for the particular configurations of environment-sensitive systems and components being developed or undergoing tests.

Scope: Using the best available upper atmosphere data base to include rawinsonde, rocketsonde and possibly other high-altitude data sources for the range location, the task is to establish a model of certain statistics for wind and thermodynamic quantities derived in a uniform manner and published in a standardized format.

Objectives: The wind statistics shall be, insofar as practical, modeled to be consistent with rigorous mathematical probability properties of the multivariate normal probability theory. The thermodynamic quantities statistics shall be, insofar as practical, modeled to be consistent with the hydrostatic equation, the equation of state, and the probability principles which are related through these physical equations. The document shall serve as an authoritative source of information and as an atmospheric model for a particular range. The first in the series of revised RRAs to be published is for Kwajalein Missile Range (KMR) (publication date December 1982). The altitude range required for KMR is 0 to 70 km. The order of priority for the subsequent publications is:

	Range	Altitude Range Required
1.	AFFTC/Edwards AFB, CA	0 - 70 km[a]
2.	ESMC/Cape Canaveral AFS, FL	0 - 70 km
3.	WSMC/Vandenberg, AFB, CA	0 - 70 km[a]
4.	WSMR/White Sands, NM	0 - 70 km
5.	PMTC/Point Mugu, CA	0 - 70 km
6.	UTTR/Dugway (Michales AAF), UT	0 - 30 km[b]
7.	AD/Eglin AFB, FL	0 - 30 km
8.	ESMC/Ascension Island	0 - 70 km (Terminates at 66 km because of insufficient data)
9.	NASA/Wallops Flight Center, VA	0 - 70 km
10.	Taquac (Guam)	0 - 30 km
11.	PMTC/Barking Sands, HI	0 - 70 km

In keeping with the RCC's objective of standardization, the modeling techniques, basic text, and tabulation format are to be the same for all RRAs. These new and revised RRAs present not only the mean values of the thermodynamic quantities (pressure, temperature, virtual temperature, and density) but also include a statistical measure for the dispersion, i.e., standard deviations and skewness coefficients. New quantities presented are water vapor pressure and dewpoint temperature. The statistical modeling for the wind is entirely new. The new approach uses the properties of the bivariate normal probability distribution function.

a. Use rocketsonde data from PMTC/Point Mugu for altitudes above 30 km.
b. Consider augmenting data base from Ely or Salt Lake City.

All final computations were performed by the United States Air Force Environmental Technical Applications Center (USAFETAC) in response to a task from Eastern Space and Missile Center (ESMC).

The test was prepared jointly between USAFETAC and the NASA/George C. Marshall Space Flight Center's Space Sciences Laboratory, Atmospheric Sciences Division. The editing and preparation of the manuscript master was performed by the NASA/MSFC organization.

The co-chairmen express their gratitude to all RRAC members and their respective colleagues who have made significant technical contributions to the establishment of these RRAs.

Special thanks are tendered to Lt. B. Novogard for his diligence in performing the many computations and the development of the primary Tables, I through IV. Special thanks goes to Lt. F. Wirsing for editing and formulating the equations for the derivable thermodynamic equations. These gentlemen performed this outstanding work under the direction of Major B. Lilius, USAFETAC.

Grateful acknowledgment goes to Mrs. Annette Tingle, NASA/MSFC, for editing the manuscript.

The RCC/MG Range Reference Atmosphere Committee consists of representatives from the U.S. Air Force, U.S. Army, National Aeronautics and Space Administration, U.S. Navy, and National Oceanographic and Atmospheric Administration. The committee members for the RRA for the first publication are:

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CHAPTER I. INTRODUCTION

A. Definition and Purpose of the Range Reference Atmosphere

A.1 Definition

A reference atmosphere is a statistical model of the Earth's atmosphere derived from upper-air measurements over a particular geographical location. Hence, the atmospheric models developed by the Range Reference Atmosphere Committee (RRAC) in response to a task by the Range Commander's Council/Meteorology Group (RCC/MG) and published by the Secretariat, Range Commander's Council (RCC) are called Range Reference Atmospheres (RRAs). This organization group, formerly called the Inter-Range Instrumentation Group/Meteorology Working Group (IRIG/MWG), published a series of RRAs during the period 1963 through 1974.

A.2 Purpose

A series of revised and expanded RRAs are to be published for locations of interest to the RCC. These publications are to serve as an authoritative reference source on certain upper air statistics and as atmospheric models for a particular range site (location). The technical usefulness of these documents for the ranges, range users, U.S. aerospace industries, and the scientific community is recognized because of the standardization of the development techniques and the presentation of the tabulations.

B. Scope of the Range Reference Atmosphere and Arrangement of Tables

B.1 Scope

The RRA contains tabulations for monthly and annual means, standard deviations, skewness coefficients for wind speed, pressure temperature, density, water vapor pressure, virtual temperature, dew-point temperature, and the means and standard deviations for the zonal and meridional wind components and the linear (product moment) correlation coefficient between the wind components. These statistical parameters are tabulated at the station elevation and at 1 km intervals from sea level to 30 km and at 2 km intervals from 30 to 90 km altitude. The wind statistics are given at approximately 10 m above the station elevations and at altitudes with respect to mean sea level thereafter. For those range sites without rocketsonde measurements, the RRAs terminate at 30 km altitude or they are extended, if required, when rocketsonde data from a nearby launch site are available. There are four sets of tables for each of the 12 monthly reference periods and the annual reference period.

B.2 Arrangement of Tables

The statistical parameters for the RRA models are presented in four tables.

Table I contains all the wind statistical parameters. This table gives the monthly and annual means and standard deviations of the zonal and meridional wind components and the linear (product moment) correlation coefficient between these two components; the mean, standard deviation and skewness coefficient of the wind speed; and the number of wind observations (sample size).

Table II contains the monthly and annual means, standard deviations, and skewness values of pressure, temperature, and density, and the number of observations used for each of these thermodynamic quantities.

Table III contains the monthly and annual means, standard deviations and skewness values of the water vapor pressure, virtual temperature and dew point, and the number of observations for each of these moisture-related quantities. The statistical parameters for water vapor pressure and dew point terminate at 15 km altitude. Above 15 km the statistical parameters for virtual temperature are considered to be the same as those for temperature.

Table IV contains the monthly and annual mean atmospheric models for the thermodynamic variables: pressure, virtual temperature, and density. This table is derived from the monthly and annual mean virtual temperature versus altitude (geometric) using the hydrostatic equation and the equation of state. Also presented is the geopotential height corresponding to the tabulated geometric altitudes.

The physical unit for all wind parameters is m/s. The physical unit for pressure is mb; for temperature and virtual temperature, K; for density, gm/m^3; and for water vapor pressure, mb. In all cases the skewness coefficient and the correlation coefficient between wind components are unitless. All reference to altitude is geometric altitude and has the unit km. All reference to height is geopotential height and has the unit geopotential m or km. All geometric altitudes and geopotential heights are with respect to mean sea level.

C. Data Quality Control Procedures

A small proportion (less than 10 percent) of the soundings in the data base used to calculate the RRA tables contained erroneous data values. The soundings which contained these erroneous values were eliminated from the data base using the following procedures:

1) Soundings containing gaps in their height data greater than 200 mb were rejected. This step was taken because some soundings only contained height values at their "mandatory" pressure levels, which were occasionally missing, resulting in soundings with no height information at all.

2) An initial set of RRA statistics was computed using all the remaining soundings. This initial set of statistics was used to determine data limits for the temperature, pressure, U and V components of the wind, and the dew point (for the 0-30 km portion of the RRA) or the density (for the

30-90 km portion of the RRA). The lower (upper) data limits were set at the mean value for a specific parameter, minus (plus) six standard deviations of that quantity. One pair of data limits was computed for each of these parameters, month of the year and data level.

3) This initial set of data limits was then used to screen the data base. All the soundings which contained values outside these data limits were rejected. A new RRA was then computed using the screened data base. This second RRA was used to generate a second set of data limits.

4) The second set of data limits was then used to screen the data base further. A new RRA was again generated. The skewness values in this RRA were then evaluated according to empirical criteria specified in Section II.A.3 of this document for the winds and according to criteria in Section III.A.3 for the thermodynamic quantities. If these criteria were satisfied, the new RRA was then used to generate a final set of data limits, which were used to quality control the data base for the final version of the RRA.

5) Occasionally, the third RRA which was generated did not satisfy all of the skewness criteria. This indicated that some incorrect values were still present in the data base. To complete quality control, the data limits-to-RRA-to-data-limits cycle was continued for additional iterations (usually one or two) until the resulting RRA satisfied the skewness criteria. At that point, a final set of data limits was generated. This final set of data limits was then used to quality control the data base and generate the final RRA.

D. Organization of the Chapters

Because there are plans to publish a series of RRAs, comments on the special organization of the document are in order. The RRA document is arranged in four chapters. Chapter I is the Introduction. Chapter II, Wind Statistics and Models, contains the techniques used to arrive at the wind statistical parameters, Table I, and the probability functions which are to be used as wind models to derive several wind statistics. Chapter III, Statistics of Thermodynamic Quantities and Models, contains the techniques used to arrive at the thermodynamic and moisture-related statistical parameters given in Tables II and III and the atmospheric thermodynamic model presented in Table IV. This chapter also contains sets of equations to calculate several atmospheric properties. Chapter IV contains the general conclusions and recommendations. These four chapters are reprinted without change for each documented RRA to assure consistency and for expediency in preparing the documentation. To account for variations particular to a specific RRA, two appendixes have been included. Appendix A, Examples of Wind Statistics, is designed to give a few illustrative examples of wind statistics for the specific RRA and cursory observations, comparisons, or comments on wind statistics. Appendix B, Range Specific Information, is designed to present specific information particular to the range, such as geographical location, data base, etc., and any cursory observations or comments on the thermodynamic quantities.

Read these appendixes! They are located as the last two units in the document because they may vary in length depending on the circumstances. Appendixes A and B and the principal Tables I, II, III, and IV are the only changes to be made to each RRA document published in this new RRA series.

CHAPTER II. WIND STATISTICS AND MODELS

A. General Considerations

A.1. Objectives

An objective of the RRA is to furnish minimum tabulation for the wind statistics. To meet this objective, the bivariate normal probability distribution was adopted as a statistical model for the wind treated as a vector quantity at the RRA data levels. Only five statistical parameters are required to completely describe this probability function. In Cartesian coordinates these parameters are the means and standard deviations of the two orthogonal components and the correlation coefficient between the two components. These five statistical parameters for the zonal and meridional (meteorological coordinates) components are given in Table I. The statistical properties of the bivariate normal probability distribution are used to derive many wind statistics that are of interest to the ranges and range users. This procedure produces consistent wind statistics that are connected through rigorous mathematical probability functions. By using these functions, extensive tabulations of wind statistics are avoided.

The statistical properties of the bivariate normal probability distribution presented for the vector wind statistical model are:

1) The wind components are univariate normally distributed.

2) The conditional distribution of one component given a value of the other component is univariate normally distributed.

3) The wind speed is of the form of a generalized Rayleigh distribution.

4) The frequency distribution of wind direction can be derived.

5) The conditional distribution of wind speed given a value of wind direction (wind rose) can be derived.

6) The five tabulated wind statistical parameters which are with respect to the meteorological zonal and meridional coordinate system can be derived for any arbitrary rotation of the orthogonal axes.

The probability distribution functions and sets of equations to derive wind statistics for the previously stated properties of the vector wind model are presented. Illustrative examples are presented in Appendix A. No attempt is made to give the derivation of the probability functions. The reader is referred to Smith (1976) for some derivations and several applications of the probability distribution properties for wind statistics.

TABLE A. LIST OF SYMBOLS USED IN CHAPTER II

N - The number of wind measurements in Table I

r - A general variable for the bivariate normal probability distribution in polar coordinates

R - A generalized Rayleigh variable used for derived wind speed probability distribution

R (U, V) - The linear (product moment) correlation coefficient between the zonal and meridional wind components in Table I

SK (W) - Skewness parameter for wind speed in Table I

S (U) - The standard deviation of the zonal wind component in Table I

S (V) - The standard deviation of the meridional wind component in Table I

S (W) - The standard deviation of wind speed in Table I

t - A standardized normal variate used in text Table A

U - The zonal wind component

UBAR - The mean value of the zonal wind component in Table I

V - The meridional wind component

VBAR - The mean value of the meridional wind component in Table I

W - Wind speed or modulus of wind vector, a scalar quantity

WBAR - The mean value of wind speed in Table I

X - A general component variable or coordinate axes

Y - A general component variable or coordinate axes

$\bar{X}$ - A general component mean value in the [x,y] coordinate system

$\bar{Y}$ - A general component mean value in the [x,y] coordinate system

α (alpha) - Rotation angle for the [x,y] coordinate system

TABLE A. (Concluded)

ϑ (theta) - Wind direction in the polar coordinate system
$\lambda_{(\ )}$ (Lambda) - A parameter in the bivariate normal probability distribution in text Table B
ξ (Xi) - The mean value in the standardized normal probability distribution used in text Table A
π (Pi) - Constant = 3.14159 ...
ρ (Rho) - The general linear correlation coefficient between the two component variables in the [x,y] coordinate system
σ_x, σ_y - The general standard deviations of the x and y component variables in the [x,y] coordinate system.

A.2. Data Quality Control

The U and V components of the wind were used to generate data limits which were set at plus and minus six standard deviations from the mean for each of the quantities. These data limits were used to screen the wind data base, as described in Section I.C. The data base was considered to be free from errors if:

1) The skewness of the wind speed was below 4.0 at data levels where the mean wind speed was less than 15 m/s, and

2) The skewness of the wind speed was below 2.5 at data levels where the mean wind speed was greater than 15 m/s.

A.3. Limitations

For the wind statistics, the correlation coefficients for like wind components and unlike wind components between altitude levels were not computed. Therefore, wind statistics with respect to altitude (profile) cannot be derived from the RRA statistics. For wind profile modeling techniques the user is referred to Smith (1976). However, the wind statistics at discrete altitudes are valid; all of the probability distribution functions given in Chapter II can be derived from the five wind component statistical parameters contained in Table I, and the derived distributions can be considered as wind models at discrete altitudes.

By convention, in the statistical literature Greek letters are used for population or theoretically known parameters, and sample estimates are denoted by English alphabetical letters or with a "hat" ($\wedge$) over the Greek letters. In Chapter II Greek letters are used for the variances and the linear correlation coefficient, and the means are denoted by $\bar{X}$ and $\bar{Y}$ when dealing with the bivariate normal distribution. It will always be understood that Table I contains sample estimates of the statistical parameters and they are with respect to the meteorological zonal (U) and meridional (V) coordinate system.

B. Coordinate System and Computation of Statistical Parameters

B.1. Coordinate System

Wind measurements are recorded in terms of magnitude and direction. The wind direction is measured in degrees clockwise from true north and is the direction from which the wind is blowing. The wind magnitude (the modulus of the vector) is the scalar quantity and is referred to as wind speed or scalar wind. A statistical description that accounts for the wind as a vector quantity is appropriate and requires a coordinate system.

For the RRA the standard meteorological coordinate system has been chosen for the wind statistics, all tables of statistical parameters, and related discussions because the coordinate system used in aerospace and related applied fields has not always been consistent.

Using Figure 1, the polar and Cartesian forms for the meteorological coordinate system are defined:

W = wind speed, scalar wind, or magnitude of the wind vector in m/s.

θ = wind direction. θ is measured in degrees clockwise from true north and is the direction from which the wind is blowing.

U = zonal wind component, positive west to east in m/s.

V = meridional wind component, positive south to north in m/s.

The components θ and W define the polar form, and the U-V components define the Cartesian forms:

$$U = -W \sin\theta \quad , \quad 0 \le \theta \le 360° \tag{1}$$

$$V = -W \cos\theta \quad . \tag{2}$$

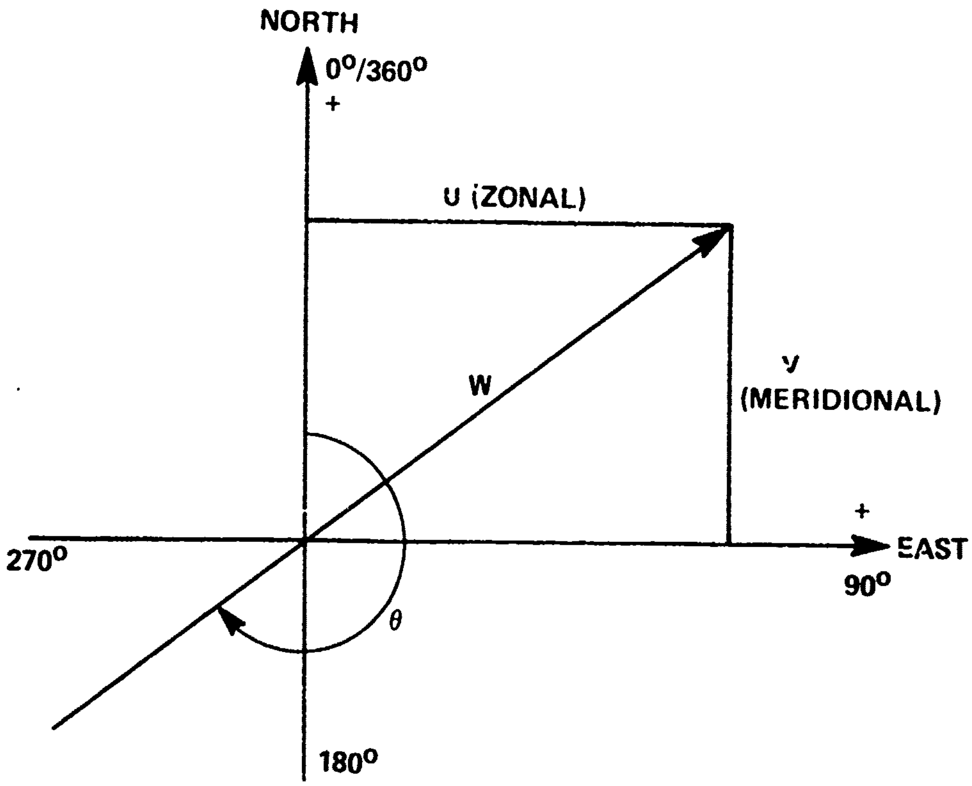

Figure 1. The meteorological coordinate system.

It is helpful to note the difference between the mathematical convention for a vector direction and the meteorological convention for wind direction, viz.:

$$\theta \text{ met} = 270 - \theta \text{ math} \tag{3}$$

when $0 \leq \theta \leq 270$ degrees

$$\theta \text{ met} = 360 + (270 - \theta \text{ math})$$

when $270 \leq \theta \leq 360$ degrees.

B.2. Computation of Statistical Parameters

The wind statistical parameters in Table I for the means and standard deviations of the zonal and meridional wind components and wind speed and the skewness parameter of wind speed were computed using the sums technique presented in Chapter III.C.3. In addition, the linear (product moment) correlation coefficient between the zonal and meridional wind components, r (u,v) in Table I, was computed. This correlation coefficient is defined as

$$r\,(u,v) = \frac{\sum_{i=1}^{n} (U_i - \bar{U})\,(V_i - \bar{V})}{N\;s(u)\cdot s(v)} \quad . \tag{4}$$

These statistical parameters are with respect to the Standard Meteorological Coordinate System.

C. Statistical Wind Models

C.1. Wind Component Statistics

The univariate normal (Gaussian) probability distribution function is used to obtain wind component statistics. In generalized notations, this probability density function (pdf) is

$$f\,(t) = \frac{e^{-\frac{t^2}{2}}}{\sqrt{2\pi}} \quad , \tag{5}$$

where $t = X - \xi/\sigma_x$ is the standardized variate with ξ defining the mean and σ_x the standard deviation. The probability distribution function (PDF) is

$$F(t) = \int_{-\infty}^{t} f(t)\;dt \quad . \tag{6}$$

Because this integral cannot be obtained in closed form, it is widely tabulated for zero mean and unit standard deviation. For a convenient reference for the RRA, selected values of F(t) are given in Table B. To emphasize the connotation of probability, F(t) is shown in Table B as $P\{X\}$. The t values in Table B are used as multiplier factors to the standard deviation to express the probability that a normally distributed variable, X, is less than or equal to a given value as

$$P\left\{X \leq \text{mean} + t\;\sigma_x\right\} = \text{probability, } p \quad . \tag{7}$$

TABLE B. VALUES OF t FOR STANDARDIZED NORMAL (UNIVARIATE) DISTRIBUTION FOR PERCENTILES AND INTERPERCENTILE RANGES

t	$P(X)$	X	$P\{X_1 \leq X \leq X_2\}$ (%)
-3.0000	0.00135	$\xi - 3.0000\ \sigma$	99.73 (0.27)
-2.5758	0.00500	$\xi - 2.5758\ \sigma$	99 (1.00)
-2.3263	0.01000	$\xi - 2.3263\ \sigma$	98 (2.00)
-2.2365	0.01266	$\xi - 2.2365\ \sigma$	97.468 (2.532)
-2.0000	0.02275	$\xi - 2.0000\ \sigma$	95.45 (4.55)
-1.9602	0.02500	$\xi - 1.9602\ \sigma$	95 (5)
-1.6449	0.05000	$\xi - 1.6449\ \sigma$	90 (10)
-1.2816	0.10000	$\xi - 1.2816\ \sigma$	80 (20)
-1.0000	0.15866	$\xi - 1.0000\ \sigma$	68.268 (31.732)
-0.8416	0.20000	$\xi - 0.8416\ \sigma$	60 (40)
-0.6745	0.25000	$\xi - 0.6745\ \sigma$	50 (50)
-0.2533	0.40000	$\xi - 0.2533\ \sigma$	20 (80)
0.0000	0.50000	ξ	
0.2533	0.60000	$\xi + 0.2533\ \sigma$	
0.6745	0.75000	$\xi + 0.6745\ \sigma$	
0.8416	0.80000	$\xi + 0.8614\ \sigma$	
1.0000	0.84134	$\xi + 1.0000\ \sigma$	
1.2816	0.90000	$\xi + 1.2816\ \sigma$	
1.6449	0.95000	$\xi + 1.6449\ \sigma$	
1.9602	0.97502	$\xi + 1.9602\ \sigma$	
2.0000	0.97725	$\xi + 2.0000\ \sigma$	
2.2365	0.98734	$\xi + 2.2365\ \sigma$	
2.3263	0.99000	$\xi + 2.3263\ \sigma$	
2.5758	0.99500	$\xi + 2.5758\ \sigma$	
3.0000	0.99865	$\xi\ \ 3.0000\ \sigma$	

where $X_1 = \xi - t\sigma$
and $X_2 = \xi + t\sigma$

For example, when $t = 1.6449$, the probability that X is less than or equal to the mean plus 1.6449 standard deviations is 0.95. That value of X which is less than or equal to the mean plus 1.6449 standard deviations is called the 95th percentile value of X. Also given in Table 2 are the numerical values to express the probability that X falls in the interval X_1 and X_2; i.e.,

$$P\left\{ X_1 \leq X \leq X_2 \right\} = \text{Interpercentile Range} \tag{8}$$

where $X_1 = \bar{X} - t\,\sigma_x$

$X_2 = \bar{X} + t\,\sigma_x$

For $t = 1.9602$ the probability that X lies in the interval X_1 and X_2 is 0.95. The values of X_1 and X_2 in this example comprise the 95th interpercentile range.

For a normally distributed variable, the mode (most frequent value) and the median (50th percentile value) are the same as the mean value. The means and standard deviations of the zonal and meridional wind components from Table I are used in equations (7) and (8) to compute the percentile values and interpercentile ranges of the zonal and meridional wind components. When equation (7) is illustrated on a normal probability graph, a straight line is formed.

C.2. The Vector Wind Model

Because wind is a vector quantity having direction and magnitude which can be expressed as two components in an orthogonal coordinate system, a probability model which describes the joint relationship is the bivariate normal probability distribution. In general component notation, the bivariate normal probability density function (BNpdf) is

$$f(X,Y) = \frac{1}{2\pi\sigma_x\sigma_y\sqrt{1-\rho^2}} \left[\exp \frac{-1}{2(1-\rho^2)} \left\{ \frac{(X-\bar{X})^2}{\sigma_x^2} - \frac{2\rho(X-\bar{X})(Y-\bar{Y})}{\sigma_x\sigma_y} + \frac{(Y-\bar{Y})^2}{\sigma_y^2} \right\} \right] \quad -\infty \leq X \leq \infty \text{ and}$$

$$-\infty \leq Y \leq \infty \quad . \tag{9}$$

where the five parameters are $\bar{x}, \bar{y}$, the component means, σ_x, σ_y, the component standard deviations, and ρ, the correlation coefficient between the two component variables, X and Y.

For many applications the interest is in determining the probability that a point $\{X,Y\}$ will fall within a contour of equal probability density. The exponential terms of equation (9), when set equal to a constant, λ^2, give a family of ellipses depending on the value of the constant. The ellipses have a common center at the point $\{\bar{X},\bar{Y}\}$. Integration of equation (9) over the region bounded by the contours of equal probability density gives

$$P(\lambda) = 1 - e^{\frac{-\lambda^2}{2(1 - \rho^2)}} \quad . \tag{10}$$

Solving for λ^2 and replacing $P(\lambda)$ by p gives

$$\lambda^2 = - 2 \, (1 - \rho^2) \ln \, (1 - p) \quad . \tag{11}$$

Now define

$$\lambda_e = \sqrt{2} \sqrt{- \ln \, (1 - p)} \quad . \tag{12}$$

For ready reference and comparisons, λ_e is shown in Table C for selected values of p.

The probability ellipse that contains p-percent of the wind vectors expressed in the most general form is the conic defined by

$$AX^2 + BXY + CY^2 + DX + EY + F = 0 \quad , \tag{13}$$

where

$$A = \sigma_y^{\,2}$$

$$B = -2\rho\sigma_x\sigma_y$$

TABLE C. VALUES OF λ FOR BIVARIATE NORMAL DISTRIBUTION ELLIPSES AND CIRCLES

P(%)	λ_e (ellipse)	λ_c (circle)	P(%)	λ_e (ellispe)	λ_c (circle)
0.000	0.0000	0.0000	65.000	1.4490	1.0246
5.000	0.3203	0.2265	68.268	1.5151	1.0713
10.000	0.4590	0.3246	70.000	1.5518	1.0973
15.000	0.5701	0.4031	75.000	1.6651	1.1774
20.000	0.6680	0.4723	80.000	1.7941	1.2686
25.000	0.7585	0.5363	85.000	1.9479	1.3774
30.000	0.8446	0.5972	86.466	2.0000	1.4142
35.000	0.9282	0.6563	90.000	2.1460	1.5175
39.347	1.0000	0.7071	95.000	2.4477	1.7308
40.000	1.0108	0.7147	95.450	2.4860	1.7579
45.000	1.0935	0.7732	98.000	2.7971	1.9778
50.000	1.1774	0.8325	98.168	2.8284	2.0000
54.406	1.2533	0.8862	98.889	3.0000	2.1213
55.000	1.2637	0.8936	99.000	3.0348	2.1460
60.000	1.3537	0.9572	99.730	3.4393	2.4320
63.212	1.4142	1.0000	99.9877	4.2426	3.0000

$$\lambda_e = \sqrt{2}\sqrt{-\ln(1-P)}$$

$$\lambda_c = \sqrt{-\ln(1-P)}$$

$$C = \sigma_x^{\;2}$$

$$D = 2\sigma_x\sigma_y\;\rho\overline{Y} - 2\sigma_y^{\;2}\overline{X} = -\;(B\overline{Y} + 2A\overline{X})$$

$$E = 2\sigma_x\sigma_y\;\rho\overline{X} - 2\sigma_x^{\;2}\overline{Y} = -\;(B\overline{X} + 2C\overline{Y})$$

$$F = A\overline{X}^2 + C\overline{Y}^2 + B\overline{X}\overline{Y} - AC\;(1 - \rho^2)\;\lambda_e^{\;2} \quad ,$$

and

$$\lambda_e = \sqrt{2}\,\sqrt{-\ln\,(1 - \rho)} \quad .$$

For graphical presentations the range of the variable is important in order to arrange the scale. The largest and smallest values of X and Y for a given probability ellipse, p, are given by

$$X_{L,S} = \overline{X} \pm \sigma_x\lambda_e \tag{14}$$

$$Y_{L,S} = \overline{Y} \pm \sigma_y\lambda_e \quad , \tag{15}$$

where, as before, $\lambda_e = \sqrt{2}\,\sqrt{-\ln\,(1 - p)}$.

Although there are several approaches to graphing the probability ellipses, the following procedure is advantageous for electronic computer plotting. In establishing the computer plotting program, the sample estimates for $\overline{X}, \overline{Y}, \sigma_x, \sigma_y$, and ρ are constants in equation (13). The user makes the choice of probability ellipses desired. Thus, p in equation (12) is programmed as a parameter. The largest and smallest values for X and Y are computed by equations (14) and (15) for the largest probability ellipse selected. This sets the graphical scale. Values of X within the range of X smallest to X largest are obtained by incrementing X between these limits. Using the quadratic equation, a solution of equation (13) is made for Y for each value of X and plotted. The centroid $(\overline{X}, \overline{Y})$ for the family of probability ellipses is plotted as a point. Labeling and other identification completes the plotting program.

For a given probability, equation (13) defines an ellipse which contains p-percent of the points X,Y. Since the entire area under the bivariate normal density function [equation (9)] is unity, upon integration for a given probability ellipse, that given ellipse contains p-percent of the total area. In the wind statistics p-percent of the wind vectors fall within the specified probability ellipse. From this point of view, a specified probability ellipse gives the joint probability that p-percent of the U-V components lie within the given ellipse.

When $\sigma_x^2 = \sigma_y^2 = \sigma^2$ and $\rho = 0$ in the bivariate normal distribution, the probability ellipses of equation (13) reduce to circles whose centers are at the means $\bar{X}, \bar{Y}$. The radii of the probability circles are $\sigma_{V1}\lambda_c$, where

$$\sigma_{V1} = \sqrt{2\sigma^2} \tag{16}$$

and

$$\lambda_c = \sqrt{-\ln(1 - p)} \quad . \tag{17}$$

Values for λ_c for selected probabilities, p, are given in Table 3.

Because this function is simple, it can be easily graphed manually. However. the generalized plotting technique for electronic computer plotters as represented by equation (13) can be advantageously used.

C.3. Derived Distributions for Wind Statistics

In this subsection the probability distribution functions and sets of equations are presented to derive certain probability distribution functions for wind statistics. These derived probability distributions are:

1) The conditional distribution of wind components

2) The generalized Rayleigh distribution for wind speed

3) The distribution for wind direction

4) The conditional distribution of wind speed given a wind direction (wind rose).

The required five statistical parameters for these derived distributions for wind statistics are given in Table I.

C.3.1. The Conditional Distribution of Wind Components

Given that two random variables X and Y are bivariate normally distributed, the conditional distribution $f(Y|X)$ is read as $f(Y)$ given X, and likewise $f(X|Y)$ is read as $f(X)$ given Y. The conditional probability distribution function $F(Y|X)$ has the mean $E(Y|X)$ and variance $\sigma^2_{(x|y)}$, where

$$E(Y|X^*) = \bar{Y} + \rho\left(\frac{\sigma_y}{\sigma_x}\right)(X^* - \bar{X}) \tag{18}$$

and

$$\sigma^2_{(y|x^*)} = \sigma_y^{\ 2}\,(1 - \rho^2) \quad . \tag{19}$$

The conditional standard deviation is

$$\sigma_{(y|x^*)} = \sigma_y\,\sqrt{1 - \rho^2} \quad . \tag{20}$$

By interchanging the variables and parameters, the conditional distribution function for $F(X|Y^*)$ has the conditional mean

$$E(X|Y^*) = \bar{X} + \rho\left(\frac{\sigma_x}{\sigma_y}\right)(Y^* - \bar{Y}) \quad , \tag{21}$$

conditional variance

$$\sigma^2_{(x|y^*)} = \sigma_x^{\ 2}\,(1 - \rho^2) \quad , \tag{22}$$

and conditional standard deviation

$$\sigma_{(x|y^*)} = \sigma_x\,\sqrt{1 - \rho^2} \quad . \tag{23}$$

The preceding conditional probability distribution functions are univariate normal distributions for a (fixed) given value for one of the bivariate normal variables. Thus the t-values given in Table 2 are applicable for conditional probabilities statements. For example,

$$F(Y|X^*) = E(Y|X^*) + t\sigma_{(y|x^*)} \quad . \tag{24}$$

For t = 1.6449 there is a 95 percent chance that Y is less than or equal to $\overline{Y} + 1.6449\ \sigma_{(y|x^*)}$ given that $X = X^*$. In symbols this statement reads

$$P\left\{ Y \leq E(Y|X^*) + 1.6449\ \sigma_{(y|x^*)}\ |X = X^* \right\} = 0.9500 \quad . \tag{25}$$

Interval probability statements can also be made; namely,

$$P\left\{ Y_1 = E(Y|X^*) - t\sigma_{(y|x^*)} \leq Y \leq Y_2 = E(Y|X^*) + t\sigma_y\ |X = X^* \right\}$$

where X* can take on any fixed value of X, but a convenient arrangement is to let $X^* = \overline{X} \pm t\sigma_x$.

The close connection of the regression function of Y on X to the conditional mean for the bivariate normal distribution is noted; namely,

$$Y = \overline{Y} + \rho \left(\frac{\sigma_y}{\sigma_x} \right) (X - \overline{X}) \quad . \tag{26}$$

Similarly, the regression function of X on Y is

$$X = \overline{X} + \rho \left(\frac{\sigma_y}{\sigma_x} \right) (Y - \overline{Y}) \quad . \tag{27}$$

These are linear functions and express the same results as would be obtained from a least-squares regression line.

C.3.2. The Generalized Rayleigh Distribution for Wind Speed

If two random variables, X and Y, are bivariate normally distributed, then the probability distribution for the modulus, R, can be derived in terms of the five parameters which define the bivariate normal distribution.

$$R = \sqrt{X^2 + Y^2} \tag{28}$$

The distribution of R so derived is called a generalized Rayleigh distribution because there are no restrictions on the parameters. For applications to the RRA, the variable R is recognized as wind speed or the modulus of the wind vector.

The probability density function for R is expressed as

$$f(R) = a_0 R e^{-a_1 R^2} \left[I_0(a_2 R^2)\, I_0(a_3 R) + 2 \sum_{k=1}^{\infty} I_k(a_2 R^2)\, I_{2k}(a_3 R) \cos 2k\psi \right] R \geq 0 \quad . \tag{29}$$

The functions, $I_0(\cdot)$, $I_k(\cdot)$, and $I_{2k}(\cdot)$ are the modified Bessel function of the first kind for zero order, kth order, and 2kth order. The coefficients are:

$$a_0 = \exp\left[-\frac{1}{2} \left\{ \frac{\bar{X}^2}{\sigma_a^2} + \frac{\bar{Y}^2}{\sigma_b^2} \right\} \right] \Big/ \sigma_a \sigma_b \quad ,$$

where σ_a^2 and σ_b^2 are the rotated variances to produce zero correlation between X and Y. σ_a and σ_b are the positive and negative roots[1] of the expression

$$\sigma^2_{(+,-)} = \frac{1}{2} \left\{ \sigma_x^2 + \sigma_y^2 \pm \left[(\sigma_x^2 + \sigma_y^2)^2 - 4\sigma_x^2 \sigma_y^2 (1 - \rho^2) \right]^{1/2} \right\} \quad ,$$

$$a_1 = (\sigma_x^2 + \sigma_y^2)/4(1 - \rho^2)\, \sigma_x^2 \sigma_y^2 \quad ,$$

1. See footnote on next page.

$$a_2 = \frac{\left[(\sigma_x^2 - \sigma_y^2)^2 + 4\rho^2\sigma_x^2\sigma_y^2\right]^{1/2}}{4(1 - \rho^2)\,\sigma_x^2\sigma_y^2} ,$$

$$a_3 = \left[\left(\frac{\bar{X}}{\sigma_a^2}\right)^2 + \left(\frac{\bar{Y}}{\sigma_b^2}\right)^2\right]^{1/2} ,$$

and

$$\tan\,\psi = \frac{\bar{Y}}{\bar{X}}\;\frac{\sigma_a^2}{\sigma_b^2} .$$

Since this density function cannot be integrated in closed form from zero to R, numerical integration is used to obtain practical results for the probability distribution function; i.e.,

$$F(R) = \int_0^{R*} f(R)\, dR \quad . \tag{30}$$

A number of special cases can be obtained from the general Rayleigh distribution [equation (29)], the most simple of which is to let $\sigma_x = \sigma_y = \sigma$ and $\bar{X} = \bar{Y} = 0$ with independent variables X and Y. This gives

---

1. This computational form is obtained from the determinant

$$\begin{vmatrix} \sigma_x^2 - K & \sigma_x\sigma_y\rho \\ \sigma_x\sigma_y\rho & \sigma_y^2 - K \end{vmatrix} ,$$

where K is $\sigma^2_{(+,-)}$, and σ_a and σ_b are analogous to the standard deviation of the major and minor axes of the bivariate normal probability ellipse.

$$f(R) = \frac{R}{\sigma^2} e^{-R^2/2\sigma^2} , \tag{31}$$

which is recognized as the classical Rayleigh probability density function. The density function, equation (31), can be integrated in closed form over any range of the variable R. Hence, the probability distribution function, F(R), for equation (31) is

$$F(R) = 1 - \exp\left\{\frac{-R^2}{2\sigma^2}\right\} . \tag{32}$$

C.3.3. The Derived Distribution of Wind Direction

Considering the wind as a vector quantity and bivariate normally distributed, the wind direction can be derived. This is done by first writing the bivariate normal probability density function in polar coordinates whose variables are

$$g(r,\theta) = r d_1 e^{-\frac{1}{2}(a^2 r^2 - 2br + c^2)} , \quad \text{(see footnote 2)} \tag{33}$$

where

$$a^2 = \frac{1}{(1-\rho^2)} \left[\frac{\sin^2\theta}{\sigma_x^2} - \frac{2\rho \cos\theta \sin\theta}{\sigma_x \sigma_y} + \frac{\cos^2\theta}{\sigma_y^2} \right] ,$$

$$b = \frac{-1}{(1-\rho^2)} \left[\frac{\bar{x} \sin\theta}{\sigma_x^2} - \frac{\rho(\bar{x}\cos\theta + \bar{y}\sin\theta)}{\sigma_x \sigma_y} + \frac{\bar{y}\cos\theta}{\sigma_y^2} \right] ,$$

$$c^2 = \frac{1}{(1-\rho^2)} \left[\frac{\bar{x}^2}{\sigma_x^2} - \frac{2\rho \bar{x}\bar{y}}{\sigma_x \sigma_y} + \frac{\bar{y}^2}{\sigma_y^2} \right] ,$$

2. This expression, equation (33), in Smith (1976) is given with respect to the mathematical convention for a vector direction.

$$d_1 = \frac{1}{2\pi\sigma_x\sigma_y\sqrt{1-\rho^2}} \quad ,$$

and $r = \sqrt{x^2 + y^2}$ is the modulus of the vector or speed and θ is the direction of the vector. After integrating $g(r, \theta)$ over $r = 0$ to ∞, the probability density function of θ is

$$g(\theta) = \frac{d_1}{a^2} e^{-\frac{1}{2}c^2} \left[1 + \sqrt{2\pi}\left(\frac{b}{a}\right) e^{\frac{1}{2}\left(\frac{b}{a}\right)^2} \Phi\left(\frac{b}{a}\right)\right] \quad , \tag{34}$$

where a^2, b, c^2, and d_1 are as previously defined in equation (33) and

$$\Phi\left(\frac{b}{a}\right) \doteq \Phi(x) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{x} e^{-\frac{1}{2}t^2} dt$$

is taken from tables of normal distribution functions or made available through a computer subroutine.

If desired, equation (34) can be integrated numerically over a chosen range of θ to obtain the probability that the vector direction will lie within the chosen range; i.e.,

$$F(\theta) = \int_{\theta_2}^{\theta_1} g(\theta)\, d\theta \quad . \tag{35}$$

One application may be to obtain the probability that the wind will flow from a given quadrant or sector as, for example, onshore.

C.3.4. The Derived Conditional Distribution of Wind Speed Given the Wind Direction (Wind Rose)

Continuing with the considerations in Section C.3.3. of this chapter, the conditional probability density function (pdf) for wind speed, r, given a specified value for the wind direction, θ, can be expressed as

$$f(r|\theta) = \frac{a^2\, r\, e^{-\frac{1}{2}(a^2 r^2 - br)}}{1 + \sqrt{2\pi}\left(\frac{b}{a}\right) e^{\frac{1}{2}\left(\frac{b}{a}\right)^2} \Phi\left\{\frac{b}{a}\right\}} \quad , \qquad (36)$$

where the coefficients, a and b and the function $\Phi\left\{\frac{b}{a}\right\}$ are as previously defined in equation (33) and in equation (34).

From equation (36) the mode (most frequent value) of the conditional wind speed given a specified value of the wind direction is the positive solution of the quadratic equation,

$$a^2\, r^2 - br - 1 = 0 \quad , \qquad (37)$$

which is

$$(\tilde{r}\,|\,\theta) = \frac{1}{2a}\left[\left(\frac{b}{a}\right) + \sqrt{4 + \left(\frac{b}{a}\right)^2}\right] \quad . \qquad (38)$$

The locus of the conditional modal values of wind speed when plotted in polar form versus the given wind directions forms an ellipse.

The noncentral moment for equation (36) is expressed as

$$\mu_n' = \int_0^\infty r^n\, f(r|\theta)\, dr \quad . \qquad (39)$$

Now the first noncentral moment is identical to the first central moment or the expected value, E $(r|\theta)$. The integration of equation (39) for the first moment is sufficiently simple to yield practical computations and can be expressed as

$$E(r|\theta) = \frac{\left(\frac{b}{a}\right) + \left[1 + \left(\frac{b}{a}\right)^2\right]\sqrt{2\pi}\; e^{\frac{1}{2}\left(\frac{b}{a}\right)^2} \Phi\left\{\frac{b}{a}\right\}}{a\left[1 + \left(\frac{b}{a}\right)\sqrt{2\pi}\; e^{\frac{1}{2}\left(\frac{b}{a}\right)^2} \Phi\left\{\frac{b}{a}\right\}\right]} \quad . \qquad (40)$$

Hence, equation (40) gives the conditional mean value of the wind speed given a specified value for the wind direction.

The integration of equation (36) for the limits $r = 0$ to $r = r^*$ gives the probability that the conditional wind speed is $\leq r^*$ given a value for the wind direction, θ. This conditional probability distribution (PDF) can be written as

$$\Pr\left\{ r \leq r^* \mid \theta = \theta_o \right\} = 1 - \left[\frac{e^{-\frac{1}{2} r_s^2} + \sqrt{2\pi}\left(\frac{b}{a}\right)\left\{1 - \Phi\,(r_s)\right\}}{e^{-\frac{1}{2}\left(\frac{b}{a}\right)^2} + \sqrt{2\pi}\left(\frac{b}{a}\right)\Phi\left\{\frac{b}{a}\right\}} \right] , \quad (41)$$

where $r_s = \left[a\, r^* - \left(\frac{b}{a}\right) \right]$.

By definition equation (41) is an expression for a "wind rose". Empirical wind rose statistics are often tabulated or graphically illustrated giving the frequency that the wind speed is not exceeded for those wind speed values which lie within assigned class intervals of the wind direction. After evaluation of equation (41) for various values of wind speed, r^*, and the given wind directions, θ, interpolations can be performed to obtain various percentile values of the conditional wind speed.

For the special case when b in equation (33) (i.e., for $\bar{x} \equiv \bar{y} = 0$), the conditional modal values of wind speeds [equation (38)], the conditional mean values of wind speeds [equation (40)], and the fixed conditional percentile values of wind speeds [interpolated from evaluations of equation (41)], when plotted in polar form versus the given wind directions produce a family of ellipses.

For the special case when $\bar{x} = \bar{y} = 0$, equation (36) reduces to the following simple case:

$$\Pr\left\{ r \leq r^* \mid \theta = \theta_0 \right\} = 1 - e^{-\frac{a^2 r^{*2}}{2}} . \quad (42)$$

There is a special significance of equation (42) when related to the bivariate normal probability distribution. If r^* and θ are measured from the centroid of the probability ellipse, then the probability that $r \leq r^*$ is the same as the given probability ellipse. Further, solving equation (42) for r^*, gives

$$r^* = \frac{1}{a}\sqrt{-2 \ln (1 - P)} . \quad (43)$$

If a probability ellipse P is chosen, equation (42) gives the distance of r along any θ from the centroid of the ellipse to the intercept of the specified probability ellipse. If there is an interest in conditional probability of winds for a given θ relative to the monthly means, equation (43) is applicable. If it is desired to find the magnitude of the wind along any θ relative to the monthly mean to the intercept of a given probability ellipse, equation (43) is applicable.

D. Statistical Parameters With Respect To Any Orthogonal Axes

The five wind statistical parameters presented in Table I are given with respect to the standard meteorological coordinate system; i.e., these parameters are for the zonal and meridional components. For many aerospace vehicles and range applications there is a need for wind statistics with respect to orthogonal axes other than west to east and south to north. For example, it may be required to present wind statistics with respect to a flight azimuth of an aerospace vehicle whose flight azimuth is α degrees from true north measured in a clockwise direction. The following sets of equations are presented to compute the five parameters for the new coordinate axes rotated α degrees clockwise from true north.

a. Rotation of the means through α degrees:

$$\bar{X}_\alpha = \bar{X} \cos (90 - \alpha) + \bar{Y} \sin (90 - \alpha) \tag{44}$$

$$\bar{Y}_\alpha = \bar{Y} \cos (90 - \alpha) - \bar{X} \sin (90 - \alpha) \quad . \tag{45}$$

b. Rotation of the variances through α degrees:

$$\sigma_{x_\alpha}^2 = \sigma_x^2 \cos^2 (90 - \alpha) + \sigma_y^2 \sin^2 (90 - \alpha)$$

$$+ 2\rho\sigma_x\sigma_y \cos (90 - \alpha) \sin (90 - \alpha) \tag{46}$$

$$\sigma_{y_\alpha}^2 = \sigma_y^2 \cos^2 (90 - \alpha) + \sigma_x^2 \sin^2 (90 - \alpha)$$

$$- 2\rho\sigma_x\sigma_y \cos (90 - \alpha) \sin (90 - \alpha) \quad . \tag{47}$$

c. Rotation of the linear correlation coefficient through α degrees:

$$\rho_\alpha = \frac{\text{cov } (X,Y)_\alpha}{\sigma_{x_\alpha} \sigma_{y_\alpha}} \quad , \tag{48}$$

where cov $(X,Y)_\alpha$ is the rotated covariance,

$$\text{cov } (X,Y)_\alpha = \text{cov } (X,Y) \, [\cos^2 (90 - \alpha) - \sin^2 (90 - \alpha)]$$

$$+ \cos (90 - \alpha) \sin (90 - \alpha) (\sigma_y^{\,2} - \sigma_x^{\,2})$$

and

$$\text{cov } (X,Y) = \rho \sigma_x \sigma_y \quad .$$

By using these rotational equations, the bivariate normal distribution with respect to any desired rotated coordinates can be obtained from sample estimates that have been computed with respect to a specific axis. The marginal distributions after rotation are also normally (univariate) distributed. By using the rotational equations, computational efforts are greatly reduced for applications requiring statistics with respect to several coordinate axes.

Appendix A presents some illustrative examples for the wind statistics of the specific RRA.

CHAPTER III. STATISTICS OF THERMODYNAMICS QUANTITIES AND MODELS

A. General Considerations

A.1. Objectives

The objectives inherent in developing the thermodynamic section of the RRA were to describe the thermodynamic characteristics of the atmosphere using a minimum of data tabulations. A set of parameters was selected which, together, thermodynamically describe the climatological state of the atmosphere. These parameters are the pressure, temperature, density, dew point, virtual temperature, and water vapor pressure. Used together, these parameters permit the calculation of a large number of derived quantities. Some of these quantities, such as the speed of sound, are dealt with in Section III.E.

The probability distribution of each of the six thermodynamic RRA parameters is described by its mean value, its standard deviation, and its skewness. Several of these parameters (temperature, pressure, dew point and density) have probability distributions which are close to a univariate normal distribution; the others do not. The skewness parameter gives an estimate of the asymmetrical departures of a probability distribution.

Hydrostatically modeled mean values of pressure and density were calculated (Table IV), so that users may determine the departure of the actual climatological values of these parameters from hydrostatic conditions. This was done by hydrostatically integrating the pressure from the lowest RRA data level to the termination altitude of the particular RRA.

TABLE D. LIST OF SYMBOLS USED IN CHAPTER III

C_s	- Speed of sound
C_d	- Collision diameter
E	- Vapor pressure
g_ϕ	- Gravity at latitude ϕ
H	- Geopotential height
H_m	- Geopotential height at a mandatory radiosonde data level
H_s	- Geopotential height at a significant radiosonde data level

TABLE D. (Continued)

K_t	- Coefficient of thermal conductivity
L	- Mean free path length
M	- Mean molecular weight of air at sea level
M3q	- Annual third moment of quantity Q
M3q	- Monthly third moment of quantity Q
n	- Refractive modulus
N	- Refractive index
NA	- Avogadro's constant
Nq	- Number of values of quantity Q
P	- Pressure
P_m	- Pressure at a mandatory radiosonde data level
P_s	- Pressure at a significant radiosonde data level
P_h	- Hydrostatically integrated mean monthly or annual pressure
Q	- Any tabulated RRA quantity
R*	- Universal gas constant
R'	- Specific gas constant of dry air
r', r*	- Parameters used in converting z to h and vice versa
S	- Sutherland's constant, used in the calculation of dynamic viscosity
T	- Temperature
T_d	- Dew point
T_v	- Virtual temperature
T_{vm}	- Virtual temperature at a mandatory radiosonde data level
T_{vs}	- Virtual temperature at a significant radiosonde data level
V	- Mean air particle speed

TABLE D. (Concluded)

V_c	- Mean collision frequency
w	- Parameter used in the hydrostatic interpolation of pressure and density
Z	- Geometric altitude
λ	- Wavelength
α_Q	- Skewness of quantity Q
β	- Constant used in the equation for viscosity
γ	- Ratio of specific heat at constant pressure to specific heat at constant volume
η	- Kinematic coefficient of viscosity
μ	- Dynamic coefficient of viscosity
ρ	- Density
ρh	- Mean monthly or annual density derived from Ph
σ	- Standard deviation of the quantity Q

A.2. Data Quality Control

Data limits derived from the following parameters were used to screen the thermodynamic portion of the RRA data base: temperature, pressure, dew point (for the 0-30 km portion only), and density (for the 30-70 km portion only). These limits were set to plus and minus six standard deviations from the mean values of each of these quantities. These limits were used to screen the thermodynamic portion of the RRA data base, according to the procedures described in Section I.C. The data base used to generate the thermodynamic portion of the RRA (Tables I, II, and IV) was considered to be free from errors if:

a) The skewness values of the pressure and temperature were between -2.5 and 2.5 at all data levels.

b) The skewness values of the density were between -3.5 and 3.5 at data levels between 0 and 30 km.

c) The skewness values of the density were between -3.0 and 3.0 at data levels between 30 and 70 km.

d) The skewness values of the dew point were between -2.5 and 2.5 at all data levels with more than 10 data values.

A.3. Limitation of Thermodynamic Statistics

The correlation coefficients between the thermodynamic quantities and the moisture-related quantities were not calculated at discrete altitudes nor were any of the correlations between altitudes. Therefore, valid statistical dispersion models that require the relationship between two or more of these quantities at the same altitude or between altitudes cannot be derived. Approximations for the correlation coefficients between pressure, virtual temperature, and density at discrete altitudes may be obtained from the coefficients of variation as developed by Buell (1970). The coefficient of variation is the standard deviation divided by the mean. The mean values and the standard deviations are taken from Table II. A model for the profile of monthly and annual mean pressure, virtual temperature, and density that is in excellent agreement with the respective statistical mean values is given by Table IV. This agreement results because the physical relationships, given by the hydrostatic equation and the equation of state, were used to derive Table IV. When only the monthly or annual mean values for pressure, virtual temperature, and density are required, it is recommended that Table IV be used.

B. Establishing Data Samples at the Required Altitude Levels

This section describes the computational procedures used to establish data samples of the thermodynamic RRA parameters at the RRA data levels. References are cited only when an equation given is one of many available in the literature or when an equation is stated in an unusual form.

B.1. Conversion of Data Recorded in Geopotential Heights to Geometric Altitude

The upper air rocketsonde observations used to obtain the table values above 30 km were recorded in terms of geometric altitude and can be interpolated directly to the altitude intervals shown in the tables. However, the radiosonde observations used to obtain the tabular values below 30 km were recorded in terms of geopotential heights. The change of coordinates from geopotential height to geometric altitude (h to z) is accomplished by calculating a table of geopotential heights which correspond exactly to the geometric altitudes at which the atmospheric parameters are tabulated. The radiosonde observations are then interpolated to these geopotential heights. The relationship used to calculate geometric altitude from geopotential height is

$$H = (r'z)/(r^*z) \quad , \tag{49}$$

where

$$r' = gr^*/9.80665$$

and

$$r^* = -2g_\phi/(\partial g_\phi/\partial z_o) \quad .$$

g_ϕ is the sea level gravity at the latitude ϕ corresponding to the proper location. This value is given by (List, 1968)

$$g_\phi = 9.780356\ (1 + 5.2885 \times 10^{-3} \sin^2\phi - 5.9 \times 10^{-6} \sin^2 (2\phi)) \quad . \tag{50}$$

$\frac{\partial g_\phi}{\partial z_o}$ is the rate of change of gravity at the sea level. This quantity is given by the equation

$$\frac{\partial g_\phi}{\partial z_o} = -3.085462 \times 10^{-6} + 2.27 \times 10^{-9} \cos (2\phi) - 2 \times 10^{-12} \cos (4\phi) \quad . \tag{51}$$

The units used for gravity are m/s^2, while the units for $\frac{\partial g_\phi}{\partial z_o}$ are s^{-2}.

The resulting table of values of H obtained by using even increments of 2 in equation (49) is shown in Table IV of the RRA. The values of H above 30 km are not used in the interpolation of original data but are included for the convenience of the user.

B.2. Calculations on the Original Rawinsonde Data Records

It was necessary to interpolate the information from the original rawinsonde data records to the geometric altitudes specified as the RRA data levels. The parameters for which this interpolation was required were the temperature, dew point, and pressure. The other parameters were calculated from the interpolated values at each RRA data level. These "derived" parameters were the water vapor pressure, density, and virtual temperature.

B.2.1. Calculation of the Geopotential Height at Significant Levels

Two somewhat different interpolation procedures were used to obtain data at the levels shown in the tables from radiosonde and rocketsonde observations. The procedure used to interpolate radiosonde observations begins with the calculation of virtual temperature at each data level in a sounding. The virtual temperature was computed by

$$T_v = T/(1. - 0.379\,(e/p)) \quad , \tag{52}$$

where T_v and T are in degrees K and e and p are in millibars.

The radiosonde soundings contain a mix of data taken at "mandatory" and "significant" levels. Pressure, temperature, and dew point information was given in these soundings at both types of levels. However, geopotential height information was only given at the mandatory levels. The heights at the significant levels were "filled in" (calculated) hydrostatically using pressure and temperature data from these levels. This procedure permitted the use of most of the significant level data in the calculation of the RRA tables. The equation used for this process was

$$H_s = Hm + 29.2712617 * \frac{(T_{vs} - T_{vm})}{2} * \ln(P_s/P_m) \quad , \tag{53}$$

where the subscripts s and m denote quantities at significant and mandatory levels. This equation was not used if the difference between two adjacent mandatory levels was greater than 200 mb. All soundings with such data gaps were rejected for use in compiling the RRA.

B.2.2. Temperature

Radiosonde temperatures were interpolated logarithmically with respect to pressure using the equation

$$T = T_U + (T_L - T_U)\ \frac{\ln p - \ln p_L}{\ln p_U - \ln p_L} \quad , \tag{54}$$

where the subscripts U and L indicate values at the nearest data levels in the actual sounding above and below the interpolated level.

B.2.3. Pressure

The pressure values in each radiosonde sounding were interpolated to the RRA data levels using the equation

$$p = pL\ \exp\left(\frac{H_L - H_U}{29.2712617\ (0.5)\ (T_{v_U} + T_{v_L})}\right) \tag{55}$$

where the subscript L indicates virtual temperature, geopotential, and pressure values at the data level below and closest to the level at which data were required.

B.2.4. Dew-Point Temperature

Dew-point values were interpolated logarithmically with respect to pressure using the equation

$$T_d = T_{dU} + (T_{dL} - T_{dU}) \left(\frac{\ln p - \ln p_L}{\ln p_U - \ln p_L} \right) \quad . \tag{56}$$

The subscripts U and L indicate data at the nearest upper and lower data levels in a sounding.

B.2.5. Derived Water Vapor Pressure

The water vapor pressure is calculated from the interpolated dew-point values at the RRA data levels using Teten's approximation:

$$e = 6.11 \text{ mb} \times 10^{7.5(T_d - 273.15)/(T_d - 35.86)} \quad . \tag{57}$$

B.2.6 Derived Density

The density values derived from radiosonde observations were calculated at the RRA data levels using the equation

$$\rho = 348.36787\ p/T_v \quad . \tag{58}$$

B.2.7 Derived Virtual Temperature

The virtual temperature values are calculated at the RRA data levels for each sounding using the equation

$$T_v = T/(1 - 0.379(e/p)) \quad , \tag{59}$$

where Tv and T are in degrees K and p and e are the pressure and vapor pressure, respectively, in millibars.

B.3. Calculations on the Original Rocketsonde Data Records

The rocketsonde data records used to calculate the RRA table values above 30 km were given in terms of geometric altitude. For this reason, slightly different calculations were required to convert the recorded data values to values at the RRA data levels. The pressure, temperature, and density were all interpolated to the RRA data levels; moisture-related parameters (virtual temperature, water vapor pressure, and dew point) were not calculated, since atmospheric moisture at altitudes above 30 km was considered to be negligible.

No interpolation was done across gaps in the pressure or temperature data within a sounding larger than 7000 m. Data values at the RRA levels within such a gap were set to missing.

B.3.1. Temperature

Rocketsonde temperatures were interpolated linearly with respect to geometric altitude using the equation

$$T = T_U + (T_L - T_U)\,\frac{Z - Z_L}{Z_U - Z_L} \tag{60}$$

where the subscripts U and L indicate values at the nearest data level in the actual sounding above and below the interpolated level.

B.3.2. Pressure

The pressure values in each rocketsonde sounding were interpolated to the RRA data levels using the equation

$$P = P_L \exp\left(-\frac{g_\phi}{R^*}\,\frac{M(Z - Z_L)}{\overline{Tv}} \cdot W^2\right) \tag{61}$$

where $\overline{T_v} = \dfrac{Tv_U + Tv_L}{2}$ and $W = \dfrac{r^*}{\left(r^* + Z + \dfrac{Z - Z_L}{2}\right)}$.

B.3.3 Density

Rocketsonde density values were interpolated using the equation

$$\rho = \rho_L \exp\left(- \frac{g_\phi M}{R^*} \frac{(Z - Z_L)}{\overline{T}_V} \cdot W^2 \right) , \tag{62}$$

where W is specified in Section III.B.3.2.

C. Computation of Statistical Parameters for Tables II and III

The procedure used for computing the monthly and annual means, standard deviations, and skewness values from the data values at the RRA data levels was accomplished in three steps. Initially, certain statistical sums were calculated and stored as the soundings in the data base were processed. These sums were then used to calculate the monthly statistics given in the RRA tables. The annual statistics were then calculated from these stored sums and the monthly statistics.

C.1. Stored Statistical Sums

The sums which were calculated were

$$\sum Q, \ \sum Q^2, \text{ and } \sum Q^3 \quad ,$$

where Q is any one of the quantities given in the thermodynamic part of the RRA.

C.2. Calculation of the Monthly Statistics

C.2.1. Monthly Means

The mean monthly values of the thermodynamic RRA quantities were calculated using the equation

$$\bar{Q} = \sum Q/N_Q \quad ,$$

where N_Q is the number of observed values of the quantity Q for a given month.

C.2.2 Monthly Standard Deviations

The monthly standard deviations of the thermodynamic RRA quantities were calculated using the equation

$$\sigma_Q = \sqrt{\frac{(N_Q \Sigma' Q^2) - (\Sigma Q)^2}{N_Q \cdot (N_Q - 1)}} \quad . \tag{63}$$

C.2.3 Monthly Skewness Values

The monthly skewness values of the wind speed and of the thermodynamic RRA quantities are calculated using the equation

$$\alpha_Q = \frac{M3_Q}{\sigma_Q^3}$$

where $M3_Q$ is the third moment of the quantity Q, σ_Q is its standard deviation, and

$$M_{3Q} = \left[\frac{\Sigma_Q^3}{N_Q} - \frac{3\Sigma_Q \Sigma_Q^2}{N_Q^2} - \frac{2\Sigma_Q^3}{N_Q^3} \right] \cdot \frac{N_Q^2}{(N_Q - 1)(N_Q - 2)} \quad . \tag{64}$$

C.3. Calculation of the Annual Statistics

Equations (63) and (64), used to calculate the monthly values of the standard deviations and skewness values, involve taking the differences between two pairs of large sums containing Q**2 and Q**3, where Q is any thermodynamic RRA quantity. Using these equations to compute the annual statistics would have resulted in a substantial loss of precision, as these sums become larger by several orders of magnitude in such a case. This problem was avoided by calculating the annual means, standard deviations, and skewness values from the monthly statistics.

C.3.1. Annual Mean Values

The annual mean values of the thermodynamic RRA quantities were calculated using the equation

$$Q_{ANN} = Q_A / N_Q \quad ,$$

where $\hat{Q}_A$ is the total of all observed values of Q and N_Q is the total number of observations of Q.

C.3.2. Annual Standard Deviations

The annual standard deviations of the thermodynamic RRA quantities were calculated using the equation

$$\sigma Q_{ANN} = \sqrt{\frac{1}{N_Q} \sum_{i=1}^{12} (N_{Qi}\ \sigma_{Qi}^{2}) + \frac{1}{N_Q} \sum_{i=1}^{12} (N_{Qi}\ \bar{Q}_i^{2}) - Q_{ANN}^{2}} \quad , \tag{65}$$

where N_{Qi} = the number of data values for Q in month i (i = 1 to 12) and Qi = the monthly mean of Q and σ_{Qi} = the standard deviation of quantity Q in month i.

C.3.3. Annual Skewness Values

The annual skewness values of the thermodynamic RRA quantities are calculated using the equation

$$M3Q_{ANN} = \frac{1}{N} \sum_{i=1}^{12} (N_{Qi}\ M_{3Qi}) + \frac{3}{NQ_{ANN}} \sum_{i=1}^{12} (N_{qi}\ \bar{Q}_i\ \sigma_{Qi}^{2})$$

$$+ \frac{1}{NQ_{ANN}} \sum_{i=1}^{12} (N_{Qi}\ Q_i^{3}) - \frac{3\bar{Q}_{ANN}}{NQ_{ANN}} \sum_{i=1}^{12} (N_{qi}\ Q_i^{2})$$

$$- \frac{3\bar{Q}_{ANN}}{NQ_{ANN}} \sum_{i=1}^{12} (N_{Qi}\ \sigma_{Qi}^{2}) + 2\bar{Q}_{ANN}^{3} \quad , \tag{66}$$

where M_{3Q} = the third moment about the mean of quantity Q in month i and M_{3Q} = the annual third moment about the mean of the quantity Q.

D. Derived Monthly Mean and Annual Mean Model Atmospheres

A set of modeled monthly mean and annual mean hydrostatic values of pressure and density was calculated from the lowest RRA data level (0 km, mean sea level) upwards to 30 km, and from 30 km upwards to 70 km. The integration from 0 to 30 km was computed independently of the integration from 30 to 70 km because of the difference in data sources. The two different values for 30 km are provided for comparison. When 30 km data are required, the values given in the 0 to 30 km table should be used. These hydrostatically modeled mean values, which are given in Table IV, are useful as a check on the validity of the pressure and density values given in Table II. In most cases, the values in Tables II and IV for any given data level are within 1 percent of each other. The hydrostatic pressure values in Table IV were calculated using the equation

$$p_1 = p_0 \exp\left(- \frac{0.034162\ (H_1 - H_0)}{0.5\ (T_{v_1} + T_{v_0})} \right) , \tag{67}$$

where, $H_1 - H_0$ is in meters and a "0" subscript refers to values at the RRA data level immediately below the level being checked. p_0 at the lowest data level is set equal to the RRA mean pressure; p_1, calculated for the next highest data level, is taken as p_0 for the level above that. This process is repeated for all the other RRA data levels. The hydrostatic density corresponding to the hydrostatic pressures is calculated from these pressures and the RRA virtual temperature values using the formula

$$\rho_H = 348.36786\ P_H/T_v \quad , \tag{68}$$

where ρ_H and P_H are the hydrostatic density and pressure shown in Table IV of the RRA.

E. Thermodynamic Quantities Derivable from the Basic Tables

Several other quantities can be calculated from the statistics listed in Tables II and III. The equations given in this section can be used to calculate the approximate mean values of these quantities at each RRA data level. It is not possible to infer or derive any information concerning the standard deviation or skewness values of these quantities from the data in Tables II and III of the RRA.

TABLE E. LIST OF PRIMARY PHYSICAL CONSTANTS

P_o = standard atmospheric pressure at sea level
= 1.013250×10^5 Newton/m^2 = 2116.22 lb/ft^2

ρ_o = standard atmospheric density at sea level
= 1.2250 kg/m^3 = 0.07[illegible] lb/ft^3

T_o = standard temperature at sea level = 288.15 K = 15.0°C = 59.0°F

g_o = standard gravity at sea level at latitude 45°32'33"
= 9.80665 m/s^2

s = Sutherland's constant used in calculation of dynamic viscosity
= 110.4 K

T_I = ice-point temperature at P_o = 273.15 K

β = constant used in calculation of dynamic viscosity
= 1.458×10^{-6} kg/sec m K$^{\frac{1}{2}}$
= 7.3025×10^{-7} lb/sec ft R$^{\frac{1}{2}}$

γ = ratio of specific heat of air at constant pressure to specific heat of air at constant volume
= 1.4

C_D = mean effective collision diameter of air molecules
= 3.65×10^{-10} m = 1.1975×10^{-9} ft

N_a = Avogodro's constant
= 6.022169×10^{26}/kg mol = 2.73179×10^{26}/lb mol

R* = gas constant = 8.31432 Joule/mol K

R' = gas constant for dry air = 2.8704×10^2 Joule/kg K

M = molecular weight of dry air = 28.966 gm/mol

E.1. Mean Air-Particle Speed

The mean air particle speed, V, is the arithmetic average of the speeds of all air particles in the volume element being considered. For a valid average to occur, there must be a sufficient number of particles involved to represent mean conditions. The equation for "V" for dry air is:

$$V = \sqrt{\frac{8}{\pi} \cdot \frac{R^{*}T}{M}} \quad . \tag{69}$$

A computational form for dry air, using tabulated values, is:

$$V = \sqrt{7.3094 \times 10^{2} \times T} \quad , \quad (m/s) \tag{70}$$

where T is the temperature in degrees K from Table Ii. Equation (69), when corrected for moist air, becomes:

$$V = \sqrt{\frac{8}{\pi} \cdot R' \, T_V} \quad . \tag{71}$$

The computational form for moist air is:

$$V = \sqrt{7.3094 \cdot 10^{2} \cdot T_V} \quad , \quad (m/s) \tag{72}$$

where T_V is the virtual temperature in degrees K from Table III.

E.2. Mean Free Path

The mean free path, L, is the mean value of the distance traveled by each neutral air particle, in a selected air parcel, between successive collisions with other particles in that parcel. A meaningful average requires that the selected parcel be large enough to contain a substantial number of particles. The equation for L is given by:

$$L = \left(\frac{\sqrt{2}}{2\pi}\right)\left(\frac{R^*T}{N_a\ C_d^{\ 2}\ P}\right) \quad , \tag{73}$$

where C_d is the effective collision diameter of the mean air molecules. The 1976 standard atmosphere value of 3.65×10^{-10} is valid for the range of altitudes in the RRA.

A computational form for moist air, using tabulated values, is:

$$L = 2.335 \times 10^{-7}\ \frac{T}{P}\ \text{(meters)} \quad , \tag{74}$$

where T is the temperature in degrees K from Table II and P is the pressure, in mb, from Table II.

A form of (73) to correct L for moist air is:

$$L = \left(\frac{\sqrt{2}}{2\pi}\right)\frac{R'MT_v}{N_a\ C_d^{\ 2}} \quad . \tag{75}$$

The computational form for moist air is:

$$L = 2.3325 \times 10^{-7}\ \frac{T_v}{P}\ \text{(meters)} \quad , \tag{76}$$

where T_v is the virtual temperature in degrees K from Table III and P is the pressure in mb from Table II.

E.3. Mean Collision Frequency

The mean collision frequency V_c is considered to be the average speed of air particles contained in an air parcel divided by the mean free path of the particles inside that parcel. Computationally this is equivalent to:

$$V_c = \frac{V}{L}\ (\text{sec}^{-1}) \quad . \tag{77}$$

To determine V_c for dry air, use V and L from equations (70) and (74). To determine V_c for moist air, use V and L from equations (72) and (76).

E.4. Speed of Sound

The expression for the speed of sound, C_s, in dry air, in m/s is

$$C_s = \sqrt{\frac{\gamma R^* T}{M}} \quad . \tag{78}$$

To compute C_s for dry air from tabulated values, use:

$$C_s = \sqrt{4.0185 \times 10^2 \times T} \quad , \quad (m/s) \tag{79}$$

where T is the temperature in degrees K from Table II. One form for the speed of sound in moist air is:

$$C_s \approx \sqrt{\gamma R' T_v} \quad , \tag{80}$$

where T_v is the virtual temperature from Table III. A computational form for moist air is:

$$C_s \approx \sqrt{4.0185 \times 10^2 \, T_v} \quad , \quad (m/s) \quad . \tag{81}$$

E.5. Dynamic Coefficient of Viscosity

The coefficient of dynamic viscosity, μ, is defined as a coefficient of internal friction developed where gas regions move adjacent to each other at different velocities. The following expression is taken from the U.S. Standard Atmosphere (1976):

$$\mu = \frac{\beta \cdot T^{3/2}}{T + S} \quad . \tag{82}$$

The computational form is:

$$\mu = \frac{(1.458 \times 10^{-6})\ T^{3/2}}{T + 110.4} \quad , \quad \left(\frac{kg}{s \cdot m}\right) \tag{83}$$

where T is temperature in degrees K from Table II.

E.6. Kinematic Coefficient of Viscosity

The kinematic coefficient of viscosity, designated as η, is defined to be the ratio of the dynamic coefficient of viscosity of a gas to its density, or:

$$\eta = \mu/\rho \quad . \tag{84}$$

The computational form is:

$$\eta = 1.0 \times 10^{3}\ \mu/\rho \quad , \quad (m^2/s) \quad , \tag{85}$$

where μ is the dynamic coefficient of viscosity from equation (83) and ρ is the density in g m^{-3} from Table II.

E.7. Coefficient of Thermal Conductivity

The empirical expression used for the coefficient of thermal conductivity, designated as K_t, is given in the 1976 Standard Atmosphere as:

$$K_t = \frac{2.65019 \times 10^{-3} \cdot T^{3/2}}{T + 245.4 \times 10^{-(12/T)}} \quad , \quad (\text{watts/m-deg K}) \tag{86}$$

where T is in degrees K.

E.8. Refractive Modulus and Refractive Index

The refractive modulus or refractivity (Selby and McClatchey, 1975; Smith and Weintraub, 1953) is defined as N, where

$$N = (n - 1) \cdot 10^6 \tag{87}$$

and n is the refractive index.

For microwave frequencies below approximately 30 GHz (equivalent to wavelengths above 1 cm), N, the refractive modulus, is given by the empirical equation

$$N = 77.6 \frac{P}{T_d} + 3.73 \times 10^5 \frac{e}{T^2} \text{ (dimensionless)} \quad , \tag{88}$$

where E and P are in millibars and T and T_d are in degrees K.

The following expression is valid for the visible and infrared wavelengths shorter than approximately 30 μm (0.03 mm).

$$N = 77.6 \frac{P}{T} + 0.584 \frac{P}{T\lambda} \text{ dimensionless} \quad . \tag{89}$$

where λ is the wavelength in microns and T is in degrees K.

The expression for N for the wavelength from 0.03 mm to 1 cm is an extremely complex function of wavelength.

CHAPTER IV. CONCLUSIONS AND RECOMMENDATIONS

Conclusions

This document satisfies the technical objectives established for the Range Reference Atmosphere committee by the Range Commanders Council Meteorology Group. Upper air statistics and models for wind and thermodynamic quantities for the specific site have been derived in a consistent and uniform manner which will be used in publications for all other assigned site locations. These Range Reference Atmospheres represent an improvement over the previously published Range Reference Atmospheres because of the availability of more extensive upper air data bases and the adaptation of more advanced statistical techniques. A statistical measure of central tendency (mean values) and a measure of dispersion (standard deviation with respect to the mean values) for monthly and annual reference periods have been tabulated for all variables in a consistent manner from data bases that have been edited and quality controlled in the same manner. Further, a statistical measure for symmetry (skewness coefficient which involves the third statistical moment) has been tabulated for all variables except the zonal and meridional wind components. Even with these improvements, the user of these Range Reference Atmospheres must recognize certain limitations of the statistical tabulations. Namely:

1) The wind profile structure with respect to altitude cannot be modeled from the RRA statistics because the inter-level and cross-level correlations were not computed.

2) The profile structure with respect to altitude for any of the thermodynamic variables or any quantities derivable from these variables cannot be modeled because the prerequisite correlations were not computed. However, the profile of monthly and annual means for pressure, virtual temperature, and density are in agreement (Table IV) with the hydrostatic equation and the equation of state.

The preceding limitations are cited to prevent a misuse of the RRAs. More extensive statistical tabulations were beyond the scope of this committee's task. As greater insight is gained through usage of these RRAs, many adaptations of the statistical tabulations for specific engineering and scientific applications are envisioned.

Recommendations

It is recommended that the wind and thermodynamic statistical tabulations and attendant models contained in the RRAs be used as a standard reference source, as may be appropriate, by the Ranges and Range users. It is further recommended that the respective Range Staff Meteorologist or responsible agency staff member be consulted for the applicability of the Range Reference Atmospheres for specific engineering applications.

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CONVERSION UNITS

Physical Constants and Conversion Factors

Numerical values in this document are given in the International System of Units (SI, Système International d'Unités). The values in parentheses are equivalent U. S. Customary Units, which are English units adapted for use by the United States of America. The SI and U. S. Customary Units provided in Table F are those normally used for measuring and reporting atmospheric data.

By definition, the following fundamental conversion factors are exact:

Type	U. S. Customary Units	Metric
Length	1 U. S. yard (yd)	0.9144 meter (m)
Mass	1 avoirdupois pound (lb)	453.59237 gram (g)
Time	1 second (s)	1 second (s)
Temperature	1 degree Rankine (°R)	9/5 degree Kelvin (°K)

To aid in the conversion of units, conversion factors based on the above fundamental conversion factors are given in Table F.

TABLE F. FACTORS FOR CONVERSION UNITS

Type of Data	METRIC Unit	METRIC Abbreviation	U. S. CUSTOMARY Unit	U. S. CUSTOMARY Abbreviation	CONVERSION Multiply	CONVERSION By	CONVERSION To Get
TEMPERATURE							
Ambient Temperature	degree Celsius	°C	degree Fahrenheit	°F	°F - 32	0.5556	°C
	degree Kelvin	°K	degree Rankine	°R	°C	1.8*	°F - 32
					°R	1.00*	°F + 459.67
					°R - 459.67	1.00*	°F
					°K	1.00*	°C + 273.15
					°K - 273.15	1.00*	°C
Temperature Change	degree Celsius	°C	degree Fahrenheit	F	°C or K	1.8*	temp change F or R
	degree Kelvin	°K	degree Rankine	°R	F or °R	0.5556	temp change °C or °K
DENSITY							
Water Vapor Vapor Concentration (Absolute Humidity) and Ambient Density	gram per cubic meter	$g\ m^{-3}$	grain per cubic foot	$gr\ ft^{-3}$	$g\ m^{-3}$	0.43700	$gr\ ft^{-3}$
	gram per cubic centimeter	$g\ cm^{-3}$			$gr\ ft^{-3}$	2.2883	$g\ m^{-3}$
					$g\ m^{-3}$	10^{-6}*	$g\ cm^{-3}$
					$g\ cm^{-3}$	4.370×10^{5}	$gr\ ft^{-3}$
					$gr\ ft^{-3}$	2.288×10^{-6}	$g\ cm^{-3}$
WIND							
Wind Speed	meter per second	$m\ s^{-1}$	mile per hour	mph	$m\ s^{-1}$	2.2369	mph
			knots	knots	mph	0.44704	$m\ s^{-1}$
			feet per second	$ft\ s^{-1}$	$m\ s^{-1}$	1.9438	knots
					knots	0.51444	$m\ s^{-1}$
					mph	0.868976	knots
					knots	1.15078	mph
					$m\ s^{-1}$	3.2808	$ft\ s^{-1}$
					$ft\ s^{-1}$	0.3048*	$m\ s^{-1}$
DISTANCE							
Length	meter	m	feet	ft	m	3.2808	ft
	micron	μ	inch	in	ft	0.3048*	m
	Angstrom unit	Å			m	2.54×10^{-4}*	μ
					m	2.54×10^{-8}*	Å
					m	10^{-6}	μ
						10^{-10}	Å

* Defined exact conversion [illegible]

TABLE F. (continued)

Type of Data	METRIC Unit	METRIC Abbreviation	U. S. CUSTOMARY Unit	U. S. CUSTOMARY Abbreviation	CONVERSION Multiply	CONVERSION By	CONVERSION To Get
DISTANCE (Concluded)					μ	10^{-6}*	m
					μ	3.937×10^{-5}	in.
					Å	10^{-10}*	m
					Å	3.937×10^{-9}	in.
MASS							
Weight	gram	g	grain	gr	lb	0.45359237*	kg
	kilogram	kg	pound	lb	lb	453.59237*	g
					kg	2.20462	lb
					g	15.4324	gr
					gr	0.06480	g
PRESSURE							
Atmospheric	newton per square meter	newton m^{-2}	pound force per square inch	lb $in.^{-2}$	mb	10^{-3}*	bar
					bar	10^{3}*	mb
	millimeter of Mercury	mmHg	inch of Mercury	in.Hg	newton m^{-2}	10^{-2}	mb
					newton m^{-2}	1.4504×10^{-4}	lb in^{-2}
					lb in^{-2}	6.8948×10^{3}	newton m^{-2}
	bar	bar			mb	1.4504×10^{-2}	lb in^{-2}
	millibar	mb			lb in^{-2}	68.948	mb
	dyne per square centimeter (microbar)	dyne cm^{-2}			mb	10^{3}	dyne cm^{-2}
					dyne cm^{-2}	10^{-3}	mb
	kilogram force per square meter	kg m^{-2}			lb in^{-2}	6.8948×10^{4}	dyne cm^{-2}
					dyne cm^{-2}	1.4504×10^{-5}	lb $in.^{-2}$
					mb	10.1972	kg m^{-2}
					kg m^{-2}	0.0980665	mb
					lb in^{-2}	703.0696	kg m^{-2}
					kg m^{-2}	0.0014223	lb in^{-2}
					mb	2.9530×10^{-2}	in.Hg (32 F)
					″	0.75006	mmHg (0 C)
					in.Hg (32 F)	25.40	mmHg (0 C)
					mmHg (0 C)	1.33322	mb
					in.Hg (32 F)	33.8639	mb
	pascal	Pa			Pa	1.00	newton m^{-2}

*Defined conversion factor

TABLE I. 1 WIND STATISTICAL PARAMETERS. JANUARY

STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	MEAN U M/S	S.D. U M/S	R(U,V)	MEAN V M/S	S.D. V M/S	MEAN WS M/S	S.D. WS M/S	SKEW WS	NOBS
.002	-6.84	2.10	.2762	-3.31	2.27	7.94	2.08	-.35	427.
1.000	-9.40	3.45	.2475	-2.62	2.84	10.19	3.36	-.16	431.
2.000	-7.18	3.35	.1623	-.92	3.21	8.10	3.42	.29	430.
3.000	-6.59	4.53	.1650	-.51	3.12	7.73	3.75	.57	429.
4.000	-7.54	4.91	.1998	-.58	3.20	8.66	4.07	.26	428.
5.000	-8.84	5.49	.1735	-1.08	3.72	10.04	4.74	.15	428.
6.000	-9.49	5.92	.1788	-1.60	4.38	10.97	5.14	.25	427.
7.000	-9.07	6.23	.1478	-2.08	4.44	10.87	5.18	.56	428.
8.000	-7.54	6.16	.0873	-2.28	4.46	9.75	4.97	.49	427.
9.000	-5.37	5.87	.0565	-2.11	4.08	8.16	4.32	.44	427.
10.000	-3.58	5.82	.0856	-1.25	4.20	7.07	3.98	.75	427.
11.000	-2.45	6.18	.0620	.16	5.15	7.40	3.98	.75	425.
12.000	-2.25	6.34	.0297	.90	5.55	7.76	4.06	.84	424.
13.000	-2.48	6.67	.0579	1.24	5.84	8.16	4.42	.83	423.
14.000	-3.23	6.87	.0610	.80	5.94	8.59	4.78	.64	423.
15.000	-4.75	6.84	-.1005	-.45	5.95	8.95	4.98	.60	416.
16.000	-6.55	6.72	-.2230	-1.68	5.01	9.53	5.00	.71	284.
17.000	-8.33	5.94	-.1630	-2.09	4.27	10.12	4.96	.48	278
18.000	-7.34	5.90	-.1056	-.51	3.49	8.74	4.98	.70	279.
19.000	-2.89	7.74	-.1115	-.36	2.46	7.24	4.67	.85	275.
20.000	-2.47	10.81	-.1614	-.11	2.36	10.19	4.93	.64	270.
21.000	-4.71	13.09	-.1130	.11	2.39	12.32	6.84	.34	261.
22.000	-6.78	12.89	.0543	.26	2.99	12.56	7.93	.45	261.
23.000	-7.70	10.75	.0975	.50	2.27	11.38	7.09	.77	250.
24.000	-8.21	10.82	.0840	.83	3.14	11.98	7.15	.93	251.
25.000	-6.78	10.53	-.0240	.68	3.18	10.80	7.11	.59	249.
26.000	-4.86	11.60	.0562	.51	2.62	10.52	7.37	.80	237.
27.000	-3.19	13.90	.1697	.68	2.65	12.28	7.52	.65	214.
28.000	-3.07	15.65	.2139	.82	2.87	14.51	7.21	.51	212.
29.000	-3.97	16.66	.2590	.61	3.29	16.00	6.87	.25	189.
30.000	-4.90	17.10	.2414	.28	2.93	16.75	6.55	-.22	166.
32.000	-.98	20.52	.0115	.05	4.07	19.39	7.57	.07	73.
34.000	-4.93	20.93	.1793	-1.06	4.38	19.82	9.19	.27	73.
36.000	-6.41	18.06	-.0956	-1.62	4.65	17.44	9.15	.54	73.
38.000	-7.45	14.82	-.0578	-.81	5.89	14.51	9.89	.87	73.
40.000	-10.10	13.54	-.0157	.59	5.73	15.60	9.36	.57	73.
42.000	-13.10	13.54	-.0281	1.60	7.14	18.23	8.59	.24	73.
44.000	-16.72	14.68	.0836	2.46	8.30	21.05	11.16	.55	73.
46.000	-24.98	17.66	-.0699	3.67	9.21	28.86	14.09	.07	73.
48.000	-29.41	20.24	-.1377	3.94	11.44	33.96	16.24	.15	72.
50.000	-21.84	23.82	-.1427	2.29	13.09	30.60	16.68	.64	72.
52.000	-5.80	22.50	.1979	1.13	14.55	24.24	12.56	.44	72.
54.000	6.69	15.97	.0374	2.37	13.33	18.90	11.01	.50	71.
56.000	13.42	16.35	-.0802	.73	12.51	21.46	11.81	.98	69.
58.000	20.17	15.23	.2127	-3.54	12.18	25.79	11.41	.17	63.
60.000	27.07	20.31	.1634	-3.61	12.79	32.66	15.78	.49	53.
62.000	30.09	23.37	.2279	-.65	14.14	36.50	17.59	.30	44.
64.000	37.03	25.40	.0905	-1.64	14.42	43.46	17.98	.09	35.
66.000	37.68	21.40	-.1434	-1.58	14.99	42.13	17.85	-.06	31.
68.000	30.73	17.92	.0835	.20	14.87	36.10	13.06	.33	29.
70.000	23.65	14.49	.0218	-1.74	20.59	32.45	11.21	-.06	29.

TABLE I. 2 WIND STATISTICAL PARAMETERS, FEBRUARY
STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	MEAN U M/S	S.D. U M/S	R(U,V)	MEAN V M/S	S.D. V M/S	MEAN WS M/S	S.D. WS M/S	SKEW WS	NOBS
.002	-7.06	2.08	.0521	-3.60	1.86	8.16	1.97	.05	398.
1.000	-9.93	3.66	.1992	-2.62	2.48	10.60	3.57	.12	401.
2.000	-7.29	4.23	.1456	-.63	2.70	8.08	3.67	.52	401.
3.000	-5.56	4.61	.1366	-.09	2.88	6.97	3.45	.32	401.
4.000	-5.96	5.35	.2468	-.13	3.07	7.69	3.79	.37	401.
5.000	-6.72	5.78	.2171	-.42	3.24	8.44	4.23	.40	401.
6.000	-7.52	6.55	.1927	-.99	4.09	9.64	4.92	.36	400.
7.000	-7.42	6.82	.0853	-1.75	4.25	9.91	4.95	.46	400.
8.000	-6.05	6.83	-.0599	-1.94	4.27	9.22	4.49	.42	399.
9.000	-4.18	6.91	-.0144	-1.71	4.12	8.23	4.15	.57	399.
10.000	-2.42	6.95	-.0045	-1.11	4.47	7.69	4.00	.68	395.
11.000	-1.14	7.18	-.0612	-.10	5.48	8.05	4.25	.82	394.
12.000	-1.03	7.09	-.0813	.38	6.26	8.42	4.48	.65	394.
13.000	-1.25	7.32	-.1054	.97	7.13	9.13	4.83	.63	394.
14.000	-2.04	7.27	-.1432	.36	7.87	9.73	4.93	.63	394.
15.000	-3.49	7.31	-.1895	-.88	7.61	10.03	4.85	.47	389.
16.000	-5.46	6.98	-.2472	-1.27	6.14	9.67	4.90	.55	261.
17.000	-7.19	6.45	-.3049	-1.45	4.60	9.70	4.72	.54	256.
18.000	-6.07	6.33	-.0749	-.53	3.77	8.18	4.96	.91	255.
19.000	-1.14	6.92	-.0001	-.45	2.29	6.35	3.77	.95	253.
20.000	-1.33	10.53	-.0796	-.26	2.33	9.97	4.28	.35	251.
21.000	-3.11	12.91	-.1198	.28	2.34	11.99	6.14	.32	242.
22.000	-4.90	12.92	-.1801	.39	2.71	11.41	8.23	.72	242.
23.000	-4.84	10.26	-.1719	.06	2.16	10.02	5.72	1.17	233.
24.000	-4.68	10.96	-.1016	-.03	2.98	10.55	6.27	.75	229.
25.000	-4.19	12.59	-.0952	.39	3.03	11.59	7.12	.32	228.
26.000	-3.38	14.11	.0409	.48	2.23	12.44	7.76	.34	220.
27.000	-3.09	15.75	.1468	.59	2.44	14.01	8.18	.19	211.
28.000	-3.72	16.84	.1606	.56	2.68	15.67	7.65	.15	209.
29.000	-4.83	17.63	.1846	.64	2.88	17.07	7.08	.00	187.
30.000	-5.94	17.80	.1721	.77	2.64	17.72	6.64	-.24	162.
32.000	-4.05	18.70	.1228	.00	3.51	17.72	8.03	-.10	64.
34.000	-9.68	17.90	.3839	-.25	3.97	18.64	8.86	-.14	64.
36.000	-14.25	16.61	-.0113	-.91	3.49	19.87	9.71	-.10	64.
38.000	-15.67	16.02	.1713	-.92	4.50	20.62	9.76	.11	64.
40.000	-16.14	14.76	.1419	1.09	5.36	19.85	10.60	.28	63.
42.000	-18.31	15.46	.1617	1.83	6.40	21.76	11.95	.06	63.
44.000	-15.11	17.49	.1940	2.43	7.03	20.88	12.26	.60	63.
46.000	-12.17	16.44	-.0036	3.36	8.38	19.39	10.97	.53	63.
48.000	-1.80	16.85	.1244	2.23	7.57	15.38	10.45	.92	63.
50.000	6.29	15.45	.0497	3.61	8.42	16.55	9.21	.61	63.
52.000	13.05	17.51	.2138	4.59	9.41	21.55	10.85	.98	62.
54.000	20.26	15.69	.1302	3.32	9.43	24.27	12.83	.20	62.
56.000	25.60	16.53	.3031	1.95	10.14	29.05	13.71	-.01	59.
58.000	30.18	17.21	.3218	-1.17	11.11	33.08	15.31	-.25	53.
60.000	35.28	19.58	.2281	-4.53	11.41	38.89	16.16	-.43	47.
62.000	31.80	22.72	.4171	-5.71	14.34	38.68	16.03	-.28	38.
64.000	30.15	22.82	.5703	-1.44	15.65	37.25	16.54	.04	32.
66.000	31.51	20.23	.3507	.50	17.29	36.61	18.66	.29	28.
68.000	26.93	18.03	.0420	.30	18.72	34.50	13.91	.49	28.
70.000	27.01	15.70	-.0383	-1.35	16.59	32.71	13.05	.24	28.

TABLE I. 3 WIND STATISTICAL PARAMETERS. MARCH
STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	MEAN U M/S	S.D. U M/S	R(U,V)	MEAN V M/S	S.D. V M/S	MEAN WS M/S	S.D. WS M/S	SKEW WS	NOBS
.002	-6.71	2.11	.2016	-2.72	2.19	7.61	1.97	-.46	426.
1.000	-8.95	3.45	.3222	-1.86	2.67	9.56	3.33	-.04	428.
2.000	-6.20	3.87	.0601	-.21	2.53	6.94	3.42	.47	427.
3.000	-4.52	4.14	.0928	.18	2.52	5.89	3.03	.60	426.
4.000	-4.28	4.38	.1126	-.06	2.78	5.96	3.11	.51	426.
5.000	-4.87	5.12	.2446	-.28	3.19	6.77	3.78	.76	425.
6.000	-5.31	6.15	.2524	-.87	4.09	8.01	4.39	.62	423.
7.000	-4.72	6.81	.2499	-1.56	4.83	8.45	4.80	.58	423.
8.000	-3.28	7.05	.2327	-1.84	4.90	8.17	4.58	.70	422.
9.000	-1.35	7.17	.2373	-1.36	4.92	7.67	4.51	1.16	422.
10.000	.29	7.46	.2654	-.54	5.22	7.87	4.60	1.11	423.
11.000	1.26	7.81	.2430	.49	6.15	8.69	4.99	.98	423.
12.000	1.93	7.89	.1471	.81	6.41	9.06	5.06	.83	422.
13.000	2.21	8.38	.0590	.54	6.98	9.64	5.45	1.00	419.
14.000	1.64	8.39	-.0395	-.69	6.64	9.46	5.35	.74	418.
15.000	.15	8.06	-.1821	-2.07	6.13	8.99	5.09	.87	415.
16.000	-2.13	7.98	-.0915	-3.15	4.84	8.85	4.80	.70	279.
17.000	-4 39	7.65	-.0135	-2.18	4.05	8.65	4.88	.76	275.
18.000	-4.07	8.05	-.0428	-.92	3.49	8.01	5.48	' 51	273.
19.000	-1.01	7.88	-.0519	-.43	2.34	7.23	4.04	.91	272.
20.000	-1.13	9.90	-.0437	-.04	2.31	9.27	4.30	.17	266.
21.000	-2.84	11.55	-.0304	.21	2.62	10.70	5.80	.38	255.
22.000	-4.45	11.58	-.0377	.21	2.72	10.77	6.71	.76	253.
23.000	-4.21	9.54	-.0596	.10	2.27	9.36	5.11	1.04	244.
24.000	-3.72	10.83	-.0666	.13	2.86	9.85	6.48	.76	249.
25.000	-4.11	12.66	.0763	.41	2.54	10.80	8.17	.60	248.
26.000	-4.61	14.55	.1149	.70	2.28	12.78	8.64	.40	235.
27.000	-5.75	16.22	.1463	.92	2.52	15.10	8.61	.28	204.
28.000	-6.73	17.39	.1969	.75	2.50	16.85	8.33	.09	203.
29.000	-8.08	18.13	.2216	.76	2.93	18.21	8.37	-.14	171.
30.000	-8.99	18.10	.2078	.98	2.63	18.54	8.43	-.38	170.
32.000	-13.10	15.72	-.0794	.94	3.87	18.49	9.48	-.09	69.
34.000	-16.36	13.53	-.0977	.61	3.91	19.30	9.61	-.05	69.
36.000	-18.64	13.20	.0186	-.19	4.53	21.10	9.78	-.12	69.
38.000	-20.82	11.84	.2262	1.44	5.50	22.97	9.02	-.11	69.
40.000	-15.29	14.47	.0551	1.05	5.43	19.65	10.96	.65	69.
42.000	-7.55	16.68	.1952	1.22	5.41	15.57	11.00	1.20	69.
44.000	1.97	17.55	-.0496	.51	7.63	17.24	8.29	.74	69.
46.000	13.12	15.00	-.0040	2.00	6.95	17.68	11 61	.55	69.
48.000	19.99	15.16	.0481	2.92	7.23	22.88	12.84	.23	69.
50.000	23.82	17.65	.1950	5.69	7.38	27.22	14.93	.29	69.
52.000	30.53	18.42	.1172	6.40	8.42	33.36	16.40	.32	70.
54.000	36.38	17.53	.1020	4.92	8.07	38.14	16.24	-.03	69.
56.000	37.70	18.96	.1368	3.22	9.22	39.58	17.54	-.08	64.
58.000	34.58	21.60	.1673	.40	8.14	36.81	19.24	.21	54.
60.000	30.02	22.79	.0453	-.41	9.16	34.42	17.72	.40	48.
62.000	27.53	21.66	-.1626	.62	14.68	34.00	16.61	1.46	38.
64.000	26.70	19.06	.1342	-2.59	15.26	33.55	13.34	.13	33.
66.000	29.94	16.16	.0729	-1.09	15.47	34.86	13.09	.77	29.
68.000	31.14	17.53	.0567	1.14	14.00	35.27	14.82	.34	26.
70.000	27.16	22.17	-.3432	4.57	13.42	33.92	16.24	.25	26.

TABLE I. 4 STATION = 913660		WIND STATISTICAL PARAMETERS. KWAJALEIN MISSLE RANGE				APRIL			
Z KM	MEAN U M/S	S.D. U M/S	R(U,V)	MEAN V M/S	S.D. V M/S	MEAN WS M/S	S.D. WS M/S	SKEW WS	NOBS
.002	-6.47	2.28	.2764	-1.90	2.45	7.22	2.13	-.48	422.
1.000	-8.58	4.01	.3460	-.91	2.98	9.36	3.44	-.23	427.
2.000	-6.23	4.23	.1653	.22	2.69	7.29	3.29	.21	427.
3.000	-3.94	4.11	.0133	.40	2.65	5.61	2.84	.65	427.
4.000	-2.46	4.13	.0462	.40	2.77	4.88	2.66	.93	428.
5.000	-1.28	4.46	.0806	.43	2.97	4.75	2.82	.89	428.
6.000	-.38	4.96	.1382	.44	3.32	5.10	3.15	.94	428.
7.000	.65	5.34	.2363	.23	3.75	5.62	3.38	1.01	428.
8.000	2.41	5.96	.2267	.09	4.38	6.67	4.00	.72	428.
9.000	4.43	5.51	.1926	.50	4.65	7.85	4.73	.78	428.
10.000	6.17	6.94	.1507	1.58	5.19	9.41	5.20	.73	427.
11.000	7.65	7.31	.1048	2.69	5.66	10.93	5.60	.62	426.
12.000	8.87	7.85	.0595	2.72	5.92	12.10	6.01	.43	424.
13.000	9.66	8.38	-.0211	2.04	6.39	13.02	6.23	.42	422.
14.000	9.61	8.43	-.0567	.36	6.47	12.80	6.45	.52	421.
15.000	8.32	8.08	-.0006	-1.13	5.84	11.61	5.91	.62	418.
16.000	4.74	7.23	.0639	-2.04	4.40	8.67	4.78	.90	274.
17.000	1.15	6.52	.0469	-2.20	3.79	6.84	4.01	1.16	267.
18.000	-1.77	6.19	.1183	-1.28	3.16	6.28	3.68	1.08	267.
19.000	-1.59	7.59	.1359	-.32	2.41	7.25	3.64	.60	265.
20.000	-2.45	9.77	.0888	-.04	2.22	8.88	5.21	.56	261.
21.000	-3.79	10.02	-.0383	.43	2.53	9.22	6.00	.80	252.
22.000	-4.55	8.82	-.0266	.42	2.53	8.72	5.36	.97	253.
23.000	-5.91	8.64	.0128	.27	2.06	8.82	6.00	.71	245.
24.000	-7.42	11.35	.0298	.24	3.06	11.15	8.29	.76	243.
25.000	-9.07	13.00	-.0362	.47	2.50	13.11	9.25	.54	240.
26.000	-10.14	14.28	.1301	.85	2.15	14.89	9.47	.34	225.
27.000	-12.45	14.80	.0901	1.05	2.48	16.96	9.65	.02	194.
28.000	-13.62	15.26	.0287	.81	2.45	17.94	10.12	.02	193.
29.000	-15.38	15.09	-.0641	.76	2.84	19.03	10.50	-.09	162.
30.000	-16.58	14.60	-.0707	.78	2.38	19.43	10.78	-.22	157.
32.000	-13.37	15.14	-.0536	.57	3.61	17.18	11.14	-.02	60.
34.000	-17.60	13.61	-.1166	-.46	3.36	19.05	11.95	-.02	60.
36.000	-20.79	11.01	.1639	-.06	4.07	21.56	10.24	.15	61.
38.000	-18.33	10.54	-.0250	.65	5.06	19.49	9.62	.16	61.
40.000	-10.45	10.74	.1379	1.33	4.24	13.64	7.55	.71	61.
42.000	-2.03	12.59	.2424	1.36	5.33	11.57	7.54	.52	61.
44.000	3.50	10.53	.1175	2.80	6.85	11.30	6.96	.84	61.
46.000	4.67	11.43	-.0369	2.10	6.20	11.36	8.04	1.65	61.
48.000	7.14	11.23	.0663	4.60	6.06	12.48	8.83	1.56	61.
50.000	10.17	10.97	-.1136	7.31	7.80	16.13	8.72	.87	60.
52.000	13.33	14.31	-.2193	6.19	7.81	18.72	11.37	.84	60.
54.000	16.27	14.85	-.4154	5.30	8.80	21.21	11.76	.81	57.
56.000	21.10	13.65	-.4251	2.22	10.19	24.61	11.47	.39	50.
58.000	20.35	13.19	.3208	-2.00	8.18	23.39	10.44	.38	44.
60.000	22.07	13.50	.1737	-3.21	8.57	24.74	11.73	.47	34.
62.000	21.69	15.84	.2045	-2.93	10.05	26.18	11.76	.33	28.
64.000	23.36	18.30	.2145	-2.30	8.20	27.30	14.10	-.05	23.
66.000	23.80	19.65	-.1644	-6.66	10.89	28.23	17.60	.23	22.
68.000	17.04	27.42	-.0537	-12.57	14.11	33.19	16.27	-.09	21.
70.000	4.44	29.36	-.0793	-12.20	13.58	32.58	10.18	-.28	19.

TABLE I. 5 WIND STATISTICAL PARAMETERS. MAY
STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	MEAN U M/S	S.D. U M/S	R(U,V)	MEAN V M/S	S.D. V M/S	MEAN WS M/S	S.D. WS M/S	SKEW WS	NOBS
.002	-6.12	2.41	.2922	-1.30	2.28	6.75	2.15	-.12	438.
1.000	-8.54	3.61	.2464	-.3.	2.52	9.05	3.25	-.18	443.
2.000	-7.38	3.93	.0304	.53	2.38	8.00	3.43	.52	443.
3.000	-5.96	4.02	.0644	.60	2.40	6.85	3.29	.51	442.
4.000	-4.18	4.06	.0249	.59	2.58	5.62	3.06	.88	442.
5.000	-2.47	4.05	.0644	.37	2.97	4.82	2.86	1.14	442.
6.000	-1.10	4.47	.1168	.49	3.29	4.87	2.92	1.21	442.
7.000	.53	4.59	.1443	.29	3.50	5.07	2.83	.88	442.
8.000	2.45	5.19	.1017	.31	3.95	6.18	3.22	.68	439.
9.000	4.15	5.58	.0685	.83	4.45	7.39	3.76	.87	438.
10.000	5.67	6.21	.0584	1.69	4.90	8.67	4.73	.82	437.
11.000	7.22	7 .3	-.0085	2.44	6.09	10.64	5.71	1.01	437.
12.000	8.92	7.48	-.0464	2.40	6.47	12.16	5.92	.60	434.
13.000	10.52	8.02	-.0254	1.86	6.89	13.60	6.38	.37	432.
14.000	11.52	8.17	.0015	.38	[illegible]	14.39	6.57	[illegible]	[illegible]
15.000	11.65	7.58	.1025	-.11	6.27	13.92	6.22	.21	423.
16.000	8.82	6.27	.2358	-.30	4.36	10.45	5.19	.30	285.
17.000	5.20	5.80	.1388	-.68	3.48	7.63	3.86	.65	277.
18.000	.16	6.05	-.0320	-.91	3.27	5.98	3.50	.84	273.
19.000	-2.79	7.25	.0166	-.22	2.59	6.95	4.31	.82	271.
20.000	-5.03	7.66	-.0035	.37	2.18	7.76	5.34	.86	268.
21.000	-6.81	7.24	.0545	.83	2.43	8.74	5.45	.96	253.
22.000	-8.76	7.01	.0565	.61	2.33	9.78	5.99	.38	253.
23.000	-10.67	8.24	.0805	.40	1.86	11.55	7.21	.26	234.
24.000	-12.36	10.86	.0688	.44	2.93	14.12	8.34	.21	233.
25.000	-14.72	12.46	-.0090	.53	2.33	16.39	10.43	.11	227.
26.000	-16.80	13.20	-.0537	.44	2.29	18.29	11.29	-.13	215.
27.000	-18.44	13.62	.0692	.41	2.52	19.72	11.95	-.25	200.
28.000	-19.41	13.76	.0772	.70	2.40	20.52	12.29	-.25	198.
29.000	-20.69	13.56	.0409	.93	3.02	21.73	12.23	-.34	173.
30.000	-20.99	12.86	.0098	.72	2.42	21.75	11.80	-.48	173.
32.000	-17.33	14.79	.0532	.93	3.51	19.62	12.09	.00	73.
34.000	-20.48	11.94	-.2362	.26	3.31	21.34	10.81	-.09	73.
36.000	-21.22	9.16	-.1980	-.02	3.87	21.70	8.83	.00	73.
38.000	-18.20	8.73	.0137	.56	4.94	19.11	8.16	.13	73.
40.000	-11.92	8.78	.2121	1.81	4.55	13.95	6.75	.25	73.
42.000	-6.04	7.75	.0095	2.15	5.19	10.04	5.15	.26	73.
44.000	-5.39	8.23	.0956	.61	6.36	10.16	5.77	.79	73.
46.000	-7.39	9.31	.1003	1.81	5.29	10.94	7.20	1.26	73.
48.000	-8.38	10.59	.1210	3.66	6.95	13.16	8.33	.88	72.
50.000	-9.56	12.85	.0319	3.08	6.87	15.14	9.07	.80	72.
52.000	-8.33	14.52	-.1519	4.25	7.00	15.90	9.60	.93	72.
54.000	-5.74	16.19	-.2280	4.03	7.63	17.04	8.69	.59	71.
56.000	-6.96	17.93	-.0563	3.39	9.56	19.05	10.26	.44	67.
58.000	-7.33	21.13	.0808	1.77	8.78	21.19	11.17	.40	59.
60.000	-7.44	26.14	.3291	1.34	7.33	23.75	14.84	.65	51.
62.000	-3.73	26.61	.0097	-1.04	10.86	25.90	12.51	.31	48.
64.000	-.37	26.75	.1149	-2.39	9.29	25.52	11.92	-.06	46.
66.000	-2.09	26.51	-.0185	-6.98	10.84	27.24	10.78	.08	46.
68.000	-7.35	28.01	.0263	-8.85	11.21	27.70	16.16	.95	46.
70.000	-10.84	28.47	-.0503	-10.13	13.25	28.47	19.56	.97	45.

TABLE I. 6 WIND STATISTICAL PARAMETERS, JUNE
STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	MEAN U M/S	S.D. U M/S	R(U,V)	MEAN V M/S	S.D. V M/S	MEAN WS M/S	S.D. WS M/S	SKEW WS	NOBS
.002	-5.30	2.70	.2921	-.99	2.25	5.05	2.21	.18	401.
1.000	-7.75	3.84	.2721	-.21	2.50	8.40	3.25	.01	405.
2.000	-7.25	3.46	.1255	.40	2.35	7.87	2.88	-.04	405.
3.000	-6.69	3.44	.0357	.47	2.42	7.38	2.86	.34	405.
4.000	-5.94	3.44	.1795	.37	2.55	6.69	3.00	.59	405.
5.000	-5.22	3.95	.1624	.27	2.93	6.36	3.34	.63	405.
6.000	-4.19	4.03	.1595	.25	3.07	5.88	2.93	.60	403.
7.000	-3.36	4.36	.1791	.23	3.13	5.60	2.96	.62	403.
8.000	-2.16	4.40	.1974	.20	3.61	5.43	2.76	.71	403.
9.000	-.81	4.87	.1834	.29	4.15	5.54	3.22	.88	400.
10.000	.30	5.64	.1397	.59	4.87	6.51	3.67	.91	401.
11.000	1.62	6.63	.0760	1.03	5.69	7.78	4.40	.73	401.
12.000	3.26	7.27	.0668	.74	6.00	8.73	4.87	.71	399.
13.000	4.74	7.98	.0613	.35	6.43	9.90	5.43	.74	398.
14.000	5.59	8.07	.1110	-.29	6.28	10.24	5.56	.59	398.
15.000	5.61	7.57	.1751	-.44	5.43	9.56	5.20	.58	394.
16.000	3.29	7.05	.1114	-.38	4.12	7.63	4.38	1.32	258.
17.000	-.68	5.66	.0120	-.40	3.44	5.71	3.43	1.01	255.
18.000	-4.92	6.28	-.0487	-.77	3.06	7.39	4.34	.53	256.
19.000	-6.88	5.30	-.0617	.04	2.43	7.90	4.35	.62	253.
20.000	-8.25	5.04	.0364	.22	2.21	8.87	4.44	.24	251.
21.000	-10.59	6.06	.0853	.77	2.60	11.34	5.26	.04	245.
22.000	-12.89	7.92	.0755	.87	2.42	13.47	7.35	.03	244.
23.000	-14.98	9.60	.0016	.79	2.00	15.46	9.05	.10	233.
24.000	-16.79	11.50	-.0777	.64	2.85	17.57	10.67	.03	232.
25.000	-18.49	12.54	.0512	.87	2.45	19.17	11.76	-.07	228.
26.000	-19.93	13.64	.0410	.83	2.29	20.56	12.90	-.15	218.
27.000	-21.65	14.26	-.0374	.64	2.80	22.46	13.25	-.24	196.
28.000	-23.01	13.28	-.0223	.58	2.34	23.38	12.85	-.34	195.
29.000	-24.87	12.28	.0859	.97	2.61	25.14	12.05	-.47	170.
30.000	-25.09	11.63	.0960	.87	2.21	25.27	11.48	-.45	163.
32.000	-24.46	10.92	-.0943	.54	3.29	24.78	10.69	-.15	73.
34.000	-23.88	9.57	.0823	-.58	3.01	24.22	9.19	-.03	72.
36.000	-24.01	9.34	.0067	-1.31	3.68	24.44	9.00	-.31	72.
38.000	-21.94	9.17	.0261	.27	4.98	22.65	8.75	-.05	72.
40.000	-20.24	9.73	.0090	1.46	4.56	21.24	8.73	.15	72.
42.000	-20.29	10.57	-.0604	1.78	5.85	21.55	9.79	.23	73.
44.000	-21.92	10.76	-.0535	1.18	5.89	22.90	10.35	.56	73.
46.000	-23.92	11.50	-.0185	2.29	5.94	24.84	11.30	.30	73.
48.000	-26.81	11.37	-.1557	3.82	5.67	27.92	10.70	.15	73.
50.000	-27.54	11.61	-.0092	5.35	7.42	29.11	11.36	.14	73.
52.000	-25.41	14.80	.0398	4.97	8.85	27.98	13.54	.39	72.
54.000	-20.12	17.54	-.0076	3.51	9.04	24.03	14.46	.44	67.
56.000	-14.78	18.31	.0621	2.42	10.96	22.81	12.43	.71	64.
58.000	-5.14	17.38	-.0487	1.26	11.18	18.39	10.54	.46	56.
60.000	-2.46	13.74	.1434	3.63	10.90	16.04	7.86	.34	45.
62.000	4.00	16.22	.0318	.45	13.46	18.97	9.53	.56	37.
64.000	7.97	15.71	.0118	-4.28	12.30	19.92	8.61	.46	36.
66.000	5.24	20.77	.0387	-5.89	10.95	21.83	11.17	.37	35.
68.000	-1.03	23.93	.2679	-7.72	14.60	26.47	11.24	.37	34.
70.000	-15.27	29.04	.1218	-13.10	19.05	36.70	15.24	-.05	30.

TABLE I. 7 WIND STATISTICAL PARAMETERS. JULY

STATION = 913560 KWAJALEIN MISSLE RANGE

Z KM	MEAN U M/S	S.D. U M/S	R(U,V)	MEAN V M/S	S.D. V M/S	MEAN WS M/S	S.D. WS M/S	SKEW WS	NOBS
.002	-4.02	2.95	.2371	-.10	2.37	5.15	1.97	.06	399.
1.000	-6.21	4.28	.1543	.58	2.91	7.45	3.19	.18	400.
2.000	-6.36	[illegible]	.0435	.83	2.58	7.37	3.02	.38	401.
3.000	-6.63	[illegible]	-.0162	.74	2.55	[illegible]	2.98	.11	401.
4.000	-6.73	3.53	-.0536	.76	2.72	7.52	3.04	.37	401.
5.000	-6.59	3.77	-.0877	.55	2.80	7.46	3.19	.48	401.
6.000	-5.80	4.02	-.0026	.40	2.93	6.86	3.38	.56	401.
7 000	-4.97	4.10	.0483	.36	2.99	6.30	3.29	.64	400.
8.000	-4.11	4.47	.0297	.49	3.26	6.21	3.03	.63	400.
9.000	-3.18	4.96	.0535	.81	3.58	6.25	3.05	.57	400.
10.000	-2.37	5.49	.1414	1.08	3.99	6.46	3.32	.75	399.
11.000	-1.50	6.37	.1635	1.38	5.02	7.39	3.89	.76	395.
12.000	-.35	7.15	.2053	.88	5.91	8.22	4.40	.89	389.
13.000	.93	8.12	.2235	.15	6.70	9.30	5.01	.96	387.
14.000	2.21	8.45	[illegible]	-.59	[illegible]	[illegible]	5.33	[illegible]	[illegible]
15.000	2.67	7.76	.2701	.16	5.48	8.61	4.81	.69	379.
16.000	.40	5.74	.1774	.30	3.72	6.09	3.14	.61	272.
17.000	-3.28	4.71	-.0259	-.02	3.19	5.75	3.16	.79	263.
18.000	-7.94	4.95	.0697	-.30	2.83	8.82	4.22	.47	251.
19.000	-9.69	4.01	.0209	.01	2.53	10.08	3.84	.04	256.
20.000	-11.18	4.34	-.0419	.57	2.35	11.50	4.18	.13	248.
21.000	-13.43	6.19	.0538	.74	2.34	13.76	5.95	.12	240.
22.000	-15.85	7.98	-.0376	.84	2.35	16.15	7.75	.20	239.
23.000	-18.31	9.58	.1427	.85	2.01	18.55	9.37	.04	224.
24.000	-20.26	11.27	.0782	.87	2.58	20.58	11.01	-.07	224.
25.000	-22.18	12.28	.0592	.70	2.43	22.46	12.02	-.20	214.
26.000	-23.51	12.68	.0762	.59	2.18	23.73	12.45	-.31	201.
27.000	-25.68	12.51	.0628	.43	2.49	25.95	12.20	-.57	174.
28.000	-26.33	11.42	.1221	.69	2.21	26.49	11.29	-.61	174.
29.000	-27.64	10.24	.1077	.94	2.77	27.84	10.10	-.56	142.
30.000	-26.96	9.45	.0448	.66	2.20	27.08	9.40	-.27	136.
32.000	-25.60	10.71	-.0716	.00	3.49	25.90	10.54	.17	58.
34.000	-27.20	7.81	.0926	-.06	3.56	27.43	7.80	.12	59.
36.000	-29.57	8.99	.0501	-.19	3.52	29.81	8.65	-.07	59.
38.000	-30.48	10.59	-.0730	-.15	4.41	30.84	10.45	.06	59.
40.000	-30.58	[illegible]	[illegible]	[illegible]	4.92	31.00	11.81	-.35	59.
42.000	-33.79	12.26	.0543	1.19	5.64	34.42	11.83	-.43	59.
44.000	-34.01	13.51	-.0021	3.06	5.84	34.86	12.89	.03	59.
46.000	-34.58	15.38	-.1440	3.40	6.71	35.54	15.00	-.20	59.
48.000	-37.28	16.67	-.1283	3.73	5.76	37.90	16.68	-.03	58.
50.000	-31.65	16.96	-.0654	3.91	7.99	33.19	16.33	.45	58.
52.000	-23.47	17.05	-.1627	4.13	11.40	27.67	14.81	.54	57.
54.000	-16.59	15.24	.1209	5.44	8.25	21.71	11.44	.62	56.
56.000	-10.84	17.29	.1795	4.23	9.91	20.23	10.86	.57	52.
58.000	-8.85	18.33	.2274	2.30	12.10	21.20	10.41	.68	45.
60.000	-6.37	20.18	.2257	3.57	14.08	22.10	12.62	.60	41.
62.000	-1.08	15.38	.0679	-.32	12.89	17.48	9.42	.38	33.
64.000	-1.61	14.43	.0537	-4.13	13.47	18.06	8.56	.51	32.
66.000	-4.50	15.82	.0957	-5.73	13.10	19.00	10.20	.44	32.
68.000	-12.88	21.72	-.0100	-10.49	11.04	24.71	15.75	1.47	31.
70.000	-18.20	25.04	-.0023	-15.35	13.09	32.81	16.49	.47	31.

TABLE I. 8 WIND STATISTICAL PARAMETERS. AUGUST

STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	MEAN U M/S	S.D. U M/S	R(U,V)	MEAN V M/S	S.D. V M/S	MEAN WS M/S	S.D. WS M/S	SKEW WS	NOBS
.002	-3.15	3.04	.2058	.27	2.34	4.61	1.85	.33	425.
1.000	-5.17	4.12	.1392	.79	2.71	6.53	2.99	.07	421.
2.000	-5.73	3.88	.0345	.79	2.44	6.72	3.06	.26	421.
3.000	-6.29	3.65	.1275	.66	2.47	7.07	3.07	.19	421.
4.000	-6.78	3.62	.1100	.59	2.68	7.51	3.19	.20	422.
5.000	-6.93	3.79	.0749	.44	3.04	7.79	3.33	.25	423.
6.000	-6.62	3.99	.1282	.36	2.99	7.57	3.40	.27	423.
7.000	-5.83	4.27	.0810	.43	2.89	6.99	3.43	.49	424.
8.000	-4.88	4.45	.0627	.37	2.98	6.46	3.29	.43	424.
9.000	-4.01	4.91	-.0085	.31	3.31	6.35	3.29	.39	424.
10.000	-3.32	5.54	.0056	.34	3.72	6.58	3.50	.44	424.
11.000	-2.36	6.51	-.0204	.24	4.80	7.44	3.95	.65	425.
12.000	-1.38	7.19	.0554	-.21	5.41	7.94	4.45	.67	421.
13.000	-.36	7.85	.1385	-.79	6.11	8.67	4.94	.69	418.
14.000	.92	8.04	.1846	-1.13	6.49	8.97	5.31	.78	416.
15.000	1.20	7.41	.2143	-.78	6.05	8.35	4.87	1.01	410.
16.000	-1.32	5.76	.1539	-.22	4.09	6.25	3.54	.99	278.
17.000	-5.59	4.12	.0331	.18	3.02	6.87	3.18	.40	272.
18.000	-9.03	4.09	.0770	-.33	3.01	9.69	3.68	.10	270.
19.000	-10.05	4.41	.1632	-.19	2.28	10.46	4.02	-.21	258.
20.000	-11.54	5.28	.0675	.25	2.13	11.81	5.12	.05	264.
21.000	-13.71	7.45	.0722	.29	2.57	14.13	7.09	.12	258.
22.000	-16.12	9.58	.0993	.58	2.31	16.44	9.42	.18	254.
23.000	-18.37	11.25	.1059	.66	2.03	18.63	11.02	.10	245.
24.000	-20.18	12.82	-.0126	.53	2.45	20.53	12.51	.00	244.
25.000	-21.86	13.05	-.0857	.58	2.58	22.15	12.83	-.14	242.
26.000	-22.80	12.76	.0506	.63	2.12	23.02	12.56	-.23	225.
27.000	-23.52	12.48	.1688	1.22	2.57	23.90	12.05	-.28	195.
28.000	-23.67	12.09	.0326	1.19	2.31	23.88	11.95	-.12	193.
29.000	-24.40	12.02	-.0449	.95	3.09	24.79	11.64	-.24	152.
30.000	-24.21	11.06	-.1125	.71	2.60	24.41	10.95	-.03	148.
32.000	-27.23	9.91	.0210	.07	3.20	27.45	9.82	.11	88.
34.000	-29.73	10.44	-.0060	-.93	3.36	29.96	10.36	-.38	88.
36.000	-32.97	11.14	-.0693	-.84	3.54	33.19	11.06	-.19	88.
38.000	-34.50	14.04	-.1984	.14	4.58	34.88	13.84	.14	88.
40.000	-35.80	16.50	-.3307	.26	5.15	36.25	16.32	.39	88.
42.000	-34.10	15.91	-.2152	1.35	5.13	34.59	15.72	.54	89.
44.000	-31.36	16.89	-.1116	.80	6.00	32.22	16.33	.46	89.
46.000	-28.28	17.27	-.1089	2.90	6.82	29.88	16.11	.72	88.
48.000	-21.45	17.77	-.1118	3.09	6.47	23.76	16.19	1.07	88.
50.000	-15.44	16.92	-.2171	3.45	6.51	19.59	13.91	1.34	88.
52.000	-10.07	15.71	-.0579	4.36	7.24	16.98	11.37	1.26	89.
54.000	-7.65	17.49	-.0680	3.24	8.09	16.95	12.26	2.48	86.
56.000	-5.53	13.83	-.0917	2.77	9.65	15.55	8.85	.65	83.
58.000	-2.06	14.79	.0231	.18	8.62	15.31	7.74	.71	77.
60.000	-1.50	15.77	-.1431	-2.19	11.42	17.59	8.48	.64	66.
62.000	3.49	16.70	-.1059	-3.82	11.05	18.64	8.60	.08	53.
64.000	7.88	15.67	.0752	-5.30	9.98	18.00	10.34	.75	53.
66.000	12.61	13.57	.0873	-6.52	11.61	20.42	9.96	.63	52.
68.000	10.92	14.89	.0082	-4.94	14.72	21.20	11.26	.41	51.
70.000	5.81	14.52	.1195	-8.84	14.87	21.10	9.57	-.13	49.

TABLE 1. 9 WIND STATISTICAL PARAMETERS. SEPTEMBER
STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	MEAN U M/S	S.D. U M/S	R(U,V)	MEAN V M/S	S.D. V M/S	MEAN WS M/S	S.D. WS M/S	SKEW WS	NOBS
.002	-2.34	3.08	.2541	.39	2.88	4.41	1.97	.49	426.
1.000	-3.98	4.44	.2925	.95	3.54	6.35	2.93	.42	426.
2.000	-4.46	4.23	.2554	.80	3.31	6.43	2.84	.40	426.
3.000	-5.26	3.99	.2853	.66	3.26	6.80	2.87	.25	425.
4.000	-5.85	3.85	.3007	.64	3.39	7.21	2.97	.34	425.
5.000	-5.87	3.93	.2928	.44	3.46	7.26	3.14	.32	424.
6.000	-5.56	4.20	.2134	.33	3.25	6.92	3.37	.57	423.
7.000	-5.18	4.21	.2276	.32	3.25	6.67	3.33	.47	424.
8.000	-4.51	4.25	.2561	.26	3.51	6.42	3.09	.55	424.
9.000	-3.92	4.77	.1658	.15	3.71	6.41	3.27	.71	424.
10.000	-3.31	5.56	.1819	-.07	4.01	6.56	3.69	1.05	425.
11.000	-2.57	6.66	.2377	-.40	5.05	7.63	4.34	1.16	424.
12.000	-1.92	7.51	.2512	-1.14	6.05	8.60	4.90	1.05	424.
13.000	-1.22	8.57	.2555	-1.99	7.11	9.91	5.56	.99	423.
14.000	-.49	9.09	.2410	-2.48	7.58	10.53	5.94	.95	420.
15.000	-.63	8.29	.3340	-1.65	6.38	9.18	5.28	1.00	416.
16.000	-3.20	6.87	.3416	-1.12	4.40	7.70	4.32	.81	267.
17.000	-6.04	4.86	.1409	-.70	3.21	7.44	3.93	.52	258.
18.000	-7.87	4.51	.0959	-.91	2.71	8.60	4.04	.36	253.
19.000	-9.09	4.57	.0547	-.13	2.58	9.60	4.25	.05	246.
20.000	-10.39	6.12	-.0037	.25	2.24	10.88	5.65	.19	244.
21.000	-12.45	8.66	-.0392	.38	2.53	13.10	6.07	.15	235.
22.000	-14.63	10.13	-.0806	.24	2.04	14.94	9.88	.16	234.
23.000	-16.80	11.47	.0294	.24	1 87	17.07	11.22	.09	228.
24.000	-18.94	12.95	.1195	.31	2.47	19.49	12.36	.00	228.
25.000	-20.54	13.24	.0453	.62	2.61	21.11	12.60	-.11	224.
26.000	-21.20	12.69	.0455	.84	2.38	21.61	12.25	-.18	213.
27.000	-21.37	12.47	.0330	.93	3.08	21.90	11.95	-.10	199.
28.000	-20.35	11.99	.1107	.94	2.39	20.63	11.79	.14	192.
29.000	-20.86	12.14	.0786	.79	2.98	21.48	11.42	.05	147.
30.000	-20.27	11.22	.0925	.27	2.29	20.58	10.87	.24	147.
32.000	-21.66	11.67	.0427	-.83	2.84	22.00	11.39	.00	87.
34.000	-22.74	13.91	-.1770	-1.13	2.91	23.54	12.87	-.27	97.
36.000	-24.40	15.40	-.2515	.52	3.69	25.52	13.96	-.21	87.
38.000	-23.90	17.57	-.1996	.64	4.37	25.93	15.04	.08	87.
40.000	-20.98	18.50	-.0862	.18	4.39	23.46	15.78	.50	87.
42.000	-15.16	17.61	.0568	1.45	5.38	19.53	13.71	.37	87.
44.000	-7.73	14.71	-.0572	2.19	6.70	15.00	9.95	1.26	87.
46.000	-1.06	11.68	-.0687	.48	5.57	10.65	7.35	2.08	86.
48.000	2.28	11.32	-.2059	1.64	6.01	10.70	7.51	1.58	86.
50.000	2.39	10.64	-.2576	2.73	6.87	11.50	6.28	.91	86.
52.000	3.91	11.32	-.2784	4.36	7.66	12.95	7.20	.82	86.
54.000	5.10	14.06	-.3063	4.82	8.28	15.55	8.43	.91	85.
56.000	8.02	15.24	-.3523	2.67	9.48	17.37	9.44	.71	84.
58.000	10.27	16.00	-.3455	.04	10.70	19.50	9.59	.49	76.
60.000	8.32	15.06	-.2742	-2.56	10.86	18.61	8.36	.45	61.
62.000	11.19	13.34	-.1856	-2.70	9.65	18.09	8.49	.15	45.
64.000	12.52	14.24	.0449	-4.12	10.73	19.70	9.91	.59	4[illegible]
66.000	11.22	13.21	.2805	-.97	10.83	17.95	9.57	.57	[illegible]
68.000	6.64	10.42	.2479	.06	12.54	16.05	6.87	.33	42.
70.000	3.71	12.55	-.0097	2.54	12.62	16.24	8.21	.79	42.

TABLE I. 10 WIND STATISTICAL PARAMETERS, OCTOBER
STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	MEAN U M/S	S.D. U M/S	R(U,V)	MEAN V M/S	S.D. V M/S	MEAN WS M/S	S.D. WS M/S	SKEW WS	NOBS
.002	-2.58	3.79	.2757	.35	2.94	5.00	2.18	1.47	443.
1.000	-3.88	5.77	.2291	.82	3.50	6.94	3.60	.74	447.
2.000	-4.32	5.56	.1405	.60	3.37	7.00	3.49	.57	447.
3.000	-4.54	5.26	.1715	.44	3.36	6.93	3.42	.65	449.
4.000	-4.64	5.23	.1973	.28	3.37	6.92	3.52	.47	449.
5.000	-4.34	5.11	.1883	.19	3.86	6.86	3.56	.53	449.
6.000	-4.05	4.83	.1701	.10	3.93	6.56	3.49	.72	448.
7.000	-3.39	4.65	.1741	-.11	3.93	6.12	3.34	.93	447.
8.000	-2.50	4.84	.1962	-.11	4.20	5.97	3.40	.89	447.
9.000	[illegible]	5.33	.2039	-.13	4.44	6.25	3.53	.82	447.
10.000	-1.22	6.12	.1865	-.18	4.83	[illegible]	3.79	.64	446.
11.000	-.39	7.43	.1624	-.43	5.62	8.27	4.30	.71	446.
12.000	.60	8.46	.1653	-.84	6.56	9.45	5.12	.62	441.
13.000	1.67	9.62	.1777	-1.28	7.72	10.97	6.00	.69	438.
14.000	2.19	10.03	.2585	-1.36	7.80	11.29	6.35	.69	435.
15.000	1.80	10.24	.2635	-1.25	6.76	10.76	6.28	.55	434.
16.000	-.33	9.15	.2502	-1.86	4.59	9.03	5.16	.72	272.
17.000	-3.83	6.82	.1874	-1.98	3.19	7.48	4.38	.74	267.
18.000	-5.59	5.54	.0543	-1.39	3.11	7.50	4.15	.80	268.
19.000	-5.74	5.55	-.0146	-.66	2.51	7.33	4.07	.37	267.
20.000	-6.85	7.93	.0543	.19	2.25	8.93	5.78	.26	262.
21.000	-9.11	10.42	-.0594	.24	2.44	11.61	7.90	.20	251.
22.000	-12.04	12.08	-.1008	.03	2.32	13.97	10.03	.12	251.
23.000	-14.53	13.00	-.0974	.04	1.98	15.84	11.53	.07	245.
24.000	-16.74	14.07	-.0011	.13	2.87	18.32	12.27	.01	244.
25.000	-17.56	13.50	-.0155	.64	2.94	18.86	12.00	-.03	242.
26.000	-16.76	12.20	.1062	.60	2.49	17.64	11.18	.10	234.
27.000	[illegible]	12.18	.1335	.54	2.94	16.66	11.14	.38	214.
28.000	[illegible]	11.75	.0286	.59	2.55	14.96	11.01	.79	214.
29.000	-12.96	12.44	.0394	.70	3.10	14.77	10.69	1.00	176.
30.000	-12.17	12.34	-.0407	.49	2.52	13.95	10.59	.99	172.
32.000	-13.19	13.70	-.1250	-.62	3.20	16.24	10.35	.05	66.
34.000	-12.35	14.33	.0192	-.81	3.41	16.00	10.62	.24	65.
36.000	-10.15	14.94	.0769	-.14	3.91	15.25	10.34	.43	65.
38.000	[illegible]	15.08	-.0856	1.17	4.73	13.88	9.62	.99	65.
40.000	-.22	13.30	-.1858	.16	4.61	11.29	8.29	1.52	65.
42.000	5.57	12.85	.0556	-1.38	4.66	12.46	7.91	.83	65.
44.000	10.18	13.46	.2516	-.95	5.71	15.91	[illegible]	.58	65.
46.000	16.45	11.64	.1588	2.62	5.51	18.42	10.16	.39	65.
48.000	20.12	11.74	-.1131	5.42	5.21	21.89	10.91	.40	35.
50.000	24.52	13.69	-.3225	5.32	7.51	26.86	12.25	.58	65.
52.000	28.92	16.46	-.2529	3.66	5.93	30.00	15.97	.33	66.
54.000	32.90	17.38	-.0786	1.15	6.66	33.89	15.74	-.08	66.
56.000	35.15	16.75	.0053	-.72	8.05	36.31	16.19	.08	65.
58.000	34.01	21.42	.0212	-1.22	8.13	37.32	16.92	-.14	60.
60.000	32.87	[illegible]	.2480	-3.76	8.90	36.15	16.34	-.29	52.
62.000	30.06	22.02	.1521	-2.55	9.68	34.26	17.56	-.26	42.
64.000	33.29	19.88	-.0016	-.95	10.24	35.22	19.10	-.08	36.
66.000	36.98	16.95	-.1547	-3.03	10.65	38.88	16.17	.16	34.
68.000	34.76	14.29	-.2285	-1.93	11.10	36.85	13.31	-.16	33.
70.000	19.98	16.61	.1956	-1.50	11.80	25.58	12.40	.98	31.

TABLE I. 11 WIND STATISTICAL PARAMETERS, KWAJALEIN MISSLE RANGE

STATION = 913660

NOVEMBER

Z KM	MEAN U M/S	S.D. U M/S	R(U,V)	MEAN V M/S	S.D. V M/S	MEAN WS M/S	S.D. WS M/S	SKEW WS	NOBS
.002	-4.55	2.52	.4217	-.99	2.82	5.65	2.01	.42	415.
1.000	-6.63	3.86	.3662	-.34	3.40	7.76	3.21	.18	416.
2.000	-6.06	3.80	.2143	.13	3.14	7.13	3.18	.42	417.
3.000	-5.60	4.09	.1459	.07	3.28	6.96	3.21	.47	417.
4.000	-5.43	4.42	.2659	-.01	3.39	6.94	3.51	.56	416.
5.000	-5.68	5.27	.2441	-.23	3.64	7.49	4.15	.55	416.
6.000	-5.62	6.06	.2976	-.56	4.01	7.87	4.77	.62	414.
7.000	-4.52	6.51	.3382	-1.02	4.27	7.69	4.78	.92	415.
8.000	-3.04	6.84	.3452	-.51	4.40	7.54	4.38	.89	415.
9.000	-1.19	7.30	.3005	-.48	4.49	7.47	4.39	1.09	416.
10.000	.66	7.95	.2522	.05	4.98	8.03	4.88	1.05	415.
11.000	2.36	8.68	.2097	.70	5.50	9.08	5.39	.92	416.
12.000	3.36	9.03	.2240	.98	5.81	9.77	5.63	.79	413.
13.000	3.80	9.65	.2080	.70	6.43	10.64	6.01	.80	412.
14.000	3.26	9.98	.1933	-.40	6.62	10.84	6.04	.78	409.
15.000	1.31	9.53	.2482	-1.69	5.87	9.82	5.76	.81	403.
16.000	-2.11	8.38	.2688	-2.75	4.48	8.89	4.81	1.06	271.
17.000	-5.36	6.79	.1032	-2.52	3.58	8.52	4.61	.48	265.
18.000	-6.38	5.98	.0932	-1.66	3.06	8.12	4.74	.65	265.
19.000	-4.42	6.57	.0940	-.47	2.44	7.07	4.33	.54	259.
20.000	-5.11	9.13	.0795	.19	2.25	9.06	5.68	.31	255.
21.000	-7.23	11.81	.0260	.34	2.53	11.84	7.60	.13	252.
22.000	-10.00	12.95	.0371	.40	2.57	13.09	9.02	.10	251.
23.000	-12.51	13.11	-.0855	.23	2.21	15.17	10.15	.06	243.
24.000	-14.43	13.54	-.1329	.16	3.26	17.00	10.62	.02	238.
25.000	-13.86	11.90	-.0534	.45	3.12	15.93	9.45	.11	233.
26.000	-11.58	10.73	.0857	.71	2.65	13.38	9.80	.53	226.
27.000	-8.73	11.21	.0560	.95	2.82	11.63	8.65	1.02	206.
28.000	-6.55	12.36	-.0283	.70	2.48	11.11	8.86	1.28	203.
29.000	-5.50	14.76	-.1225	.46	2.97	13.35	8.83	.80	160.
30.000	-4.62	15.64	-.0739	.17	2.79	14.87	7.16	.26	155.
32.000	-2.49	18.30	-.0357	.13	3.21	15.50	10.33	.39	53.
34.000	2.48	17.80	.3332	.71	4.00	16.39	8.12	.50	52.
36.000	9.47	19.21	-.0361	.43	5.72	19.21	10.81	-.16	52.
38.000	14.55	20.30	-.3969	-1.37	5.85	22.98	11.21	-.13	52.
40.000	20.65	16.49	-.2603	-.73	6.14	23.40	12.71	-.29	52.
42.000	24.98	13.45	-.2434	1.02	5.33	26.44	11.56	-.05	52.
44.000	27.33	12.90	-.2890	1.48	6.45	28.87	11.07	-.55	52.
46.000	29.92	14.62	-.0138	1.87	6.76	31.21	13.53	-.56	52.
48.000	30.93	15.66	.0594	1.92	7.17	32.33	14.50	-.58	52.
50.000	32.54	16.80	.1679	.41	7.63	33.57	16.46	-.38	51.
52.000	31.10	20.89	-.0970	1.26	7.10	34.37	16.42	-.18	51.
54.000	30.66	20.92	-.0212	1.05	7.91	34.22	16.29	.08	49.
56.000	31.72	18.53	.1017	-.11	8.16	33.91	16.22	-.26	46.
58.000	32.06	20.70	.2172	-1.07	8.96	35.60	16.26	-.02	44.
60.000	28.17	24.56	.0398	.81	10.40	35.35	15.67	-.02	44.
62.000	26.97	27.63	.2491	.25	10.87	36.90	15.20	-.26	39.
64.000	28.80	29.35	.5522	-1.41	12.90	40.39	14.34	-.18	36.
66.000	29.15	24.09	.3533	-3.21	11.75	36.11	15.17	-.05	35.
68.000	22.98	21.47	.1338	-5.35	13.47	31.11	14.63	.33	35.
70.000	6.04	20.91	-.1701	-4.03	15.56	23.50	12.84	.05	34.

TABLE I. 12 WIND STATISTICAL PARAMETERS, DECEMBER
STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	MEAN U M/S	S.D. U M/S	R(U,V)	MEAN V M/S	S.D. V M/S	MEAN WS M/S	S.D. WS M/S	SKEW WS	NOBS
.002	-6.83	2.06	.1079	-2.91	2.33	7.82	1.92	-.06	429.
1.000	-10.07	3.58	.1481	-2.40	3.07	10.89	3.30	-.27	433.
2.000	-8.12	4.02	.0193	-.98	2.91	8.88	3.54	.04	434.
3.000	-7.25	4.51	.0260	-.34	2.83	8.20	3.72	.20	434.
4.000	-7.99	4.92	.0593	-.76	3.10	9.00	4.15	.25	434.
5.000	-9.12	5.73	.0919	-1.43	3.84	10.38	4.99	.35	433.
6.000	-9.65	6.36	.1741	-2.00	4.51	11.33	5.43	.35	433.
7.000	-9.07	6.84	.2334	-2.62	4.85	11.27	5.68	.35	433.
8.000	-6.98	7.18	.2897	-2.54	5.08	10.03	5.64	.48	431.
9.000	-4.41	7.40	.3080	-1.72	5.32	8.95	5.21	.96	430.
10.000	-2.13	7.52	.2918	-.59	5.67	8.27	5.01	1.26	428.
11.000	-.38	7.89	.2177	.50	6.12	8.69	4.92	1.13	428.
12.000	.24	7.90	.1959	1.03	6.13	8.89	4.68	.69	427.
13.000	.31	8.10	.1534	.85	6.31	9.13	4.76	.61	425.
14.000	-.20	7.94	.0821	-.52	6.36	8.92	4.90	.66	425.
15.000	-1.99	7.44	.0399	-2.24	5.75	8.53	4.86	.80	421.
16.000	-4.61	6.11	.0248	-2.79	4.45	8.14	4.46	.74	277.
17.000	-8.06	5.53	-.0731	-2.68	3.98	9.77	4.78	.46	275.
18.000	-9.23	6.08	-.0118	-1.49	3.78	10.49	5.34	.68	271.
19.000	-4.19	7.94	.0177	-.62	2.68	7.98	4.93	.87	265.
20.000	-3.36	10.48	-.0630	.17	2.33	9.87	5.38	.29	260.
21.000	-5.90	12.61	-.1413	.66	2.66	12.19	7.23	.17	250.
22.000	-8.49	13.34	-.0750	.39	2.84	13.48	8.72	.20	249.
23.000	-10.42	12.33	-.0327	.22	2.25	13.91	8.47	.23	245.
24.000	-11.92	11.90	-.0526	-.07	2.93	14.84	8.47	.13	241.
25.000	-9.45	9.79	-.0034	.43	3.28	11.78	7.55	.51	239.
26.000	-6.29	9.91	.1711	.96	2.45	9.13	7.81	1.03	222.
27.000	-3.21	13.02	.1787	1.05	2.85	11.42	7.67	.91	204.
28.000	-2.06	16.47	.2204	.91	2.93	14.67	7.93	.47	204.
29.000	-.50	18.76	.2547	.86	3.33	17.74	6.91	.07	178.
30.000	1.10	20.54	.2441	.74	3.19	19.59	6.91	.15	173.
32.000	6.51	21.61	.0845	.46	4.83	20.59	10.18	.60	70.
34.000	7.70	23.02	-.0169	-.03	6.31	22.41	10.96	.24	70.
36.000	7.64	19.60	.1280	.96	7.58	19.23	11.25	.45	70.
38.000	8.66	17.65	.3985	-.04	7.87	17.69	11.50	.53	70.
40.000	11.26	17.07	.3503	-.41	7.65	18.04	12.17	.65	70.
42.000	12.58	16.80	.2285	2.25	8.18	19.13	11.99	.86	70.
44.000	11.16	18.48	.3822	3.23	9.17	20.77	11.18	.61	70.
46.000	8.33	18.25	.3560	3.87	9.66	19.99	10.52	.24	70.
48.000	7.22	18.18	.0939	1.07	9.34	19.13	10.16	.79	70.
50.000	7.30	22.26	-.1727	1.69	9.64	21.62	13.09	1.15	70.
52.000	9.91	21.93	-.2766	.34	10.31	22.16	13.74	1.03	70.
54.000	11.08	24.22	-.3115	.92	12.56	24.53	16.09	1.47	68.
56.000	12.07	23.50	-.2036	3.20	9.66	24.44	14.05	.41	66.
58.000	15.13	24.23	-.0119	2.58	9.46	26.47	14.30	.18	66.
60.000	17.83	25.59	-.0955	.08	11.04	29.26	15.13	.26	58.
62.000	21.66	25.60	.0251	-4.61	10.50	31.09	16.94	.57	45.
64.000	21.20	21.31	.0393	-2.61	10.59	26.85	17.17	.77	40.
66.000	21.39	21.44	.3249	-4.54	12.97	27.36	17.92	.66	36.
68.000	21.15	27.54	.0108	-1.99	13.93	31.92	19.21	.69	36.
70.000	14.20	29.73	-.2361	3.37	17.40	33.56	15.75	.52	36.

TABLE I. 13 WIND STATISTICAL PARAMETERS, KWAJALEIN MISSLE RANGE ANNUAL

STATION = 913660

Z KM	MEAN U M/S	S.D. U M/S	R(U,V)	MEAN V M/S	S.D. V M/S	MEAN WS M/S	S.D. WS M/S	SKEW WS	NOBS
.002	-5.15	3.15	.4388	-1.39	2.82	6.36	2.43	.08	5049.
1.000	-7.42	4.58	.3731	-.68	3.23	8.59	3.63	.12	5078.
2.000	-6.37	4.27	.1536	.13	2.90	7.48	3.35	.39	5079.
3.000	-5.72	4.31	.1175	.27	2.86	6.98	3.30	.46	5078.
4.000	-5.63	4.62	.1637	.17	3.02	7.04	3.56	.56	5077.
5.000	-5.64	5.25	.1916	-.07	3.38	7.36	4.09	.72	5075.
6.000	-5.42	5.89	.2367	-.30	3.79	7.62	4.51	.87	5065.
7.000	-4.67	6.27	.2536	-.51	4.05	7.54	4.59	1.01	5067.
8.000	-3.32	6.51	.2258	-.66	4.28	7.34	4.28	.95	5059.
9.000	-1.77	6.78	.2037	-.38	4.42	7.20	4.13	.99	5055.
10.000	-.41	7.23	.2034	.13	4.80	7.52	4.35	1.04	5047.
11.000	.80	7.94	.1726	.72	5.63	8.52	4.84	1.01	5040.
12.000	1.72	8.48	.1582	.74	6.14	9.28	5.20	.84	5012.
13.000	2.41	9.19	.1347	.38	6.78	10.19	5.69	.61	4991.
14.000	2.61	9.46	.1161	-.43	6.83	10.45	5.90	.77	4973.
15.000	1.84	9.28	.1113	-1.05	6.19	9.88	5.60	.74	4918.
16.000	-.69	8.29	.1103	-1.45	4.70	8.42	4.76	.65	3278.
17.000	-3.86	7.12	.0347	-1.40	3.80	7.83	4.45	.79	3208.
18.000	-5.82	6.52	-.0080	-.92	3.27	8.15	4.64	.83	3191.
19.000	-4.91	7.21	-.0067	-.32	2.47	7.94	4.39	.52	3151.
20.000	-5.70	9.16	-.0437	.15	2.27	9.74	5.19	.31	3100.
21.000	-7.77	10.85	-.0441	.44	2.51	11.73	6.95	.33	2994.
22.000	-9.90	11.59	-.0356	.43	2.53	12.94	8.47	.44	2984.
23.000	-11.54	11.82	-.0345	.36	2.10	13.77	9.37	.55	2869.
24.000	-12.89	13.20	-.0259	.35	2.89	15.44	10.52	.48	2856.
25.000	-13.42	13.88	-.0234	.56	2.77	16.07	11.08	.43	2814.
26.000	-13.30	14.65	.0596	.68	2.35	16.37	11.40	.40	2671.
27.000	-13.26	15.85	.0886	.78	2.70	17.47	11.41	.36	2411.
28.000	-13.22	16.52	.0885	.77	2.53	18.21	11.12	.34	2390.
29.000	-13.60	17.36	.0729	.78	2.99	19.54	10.69	.23	2006.
30.000	-13.64	17.39	.0733	.62	2.60	19.81	10.18	.15	1968.
32.000	-13.72	18.57	.0133	.18	3.59	20.70	[illegible]	[illegible]	[illegible]
34.000	-15.28	18.70	.0677	-.36	3.89	21.85	11.03	.01	832.
36.000	-16.34	19.00	.0290	-.30	4.49	22.68	11.62	.13	833.
38.000	-15.55	19.68	-.0408	.17	5.31	22.39	12.54	.49	833.
40.000	-12.99	20.55	-.0366	.66	5.41	20.91	13.60	.89	832.
42.000	-10.14	21.53	.0114	1.35	5.90	20.51	13.54	.87	833.
44.000	-7.67	22.23	.0247	1.62	6.96	20.81	13.13	.91	833.
46.000	-6.13	23.65	-.0247	2.50	7.08	21.29	14.18	.77	832.
48.000	-4.11	25.14	-.0429	3.21	7.32	22.19	14.90	.82	829.
50.000	-1.03	25.47	-.0497	3.73	8.38	22.87	14.56	.87	827.
52.000	3.87	25.18	-.0422	3.84	9.19	23.21	14.53	.82	826.
54.000	8.29	24.82	-.1030	3.37	9.29	23.65	14.99	.92	807.
56.000	11.29	24.51	-.0845	2.21	9.91	24.75	14.86	.74	769.
58.000	13.75	24.27	-.0118	-.01	9.98	25.60	14.98	.71	697.
60.000	14.87	25.35	-.0746	-1.02	10.95	27.20	15.74	.61	600.
62.000	16.54	24.71	.0582	-1.99	11.95	27.96	15.89	.69	490.
64.000	17.82	24.14	.2012	-2.89	11.92	28.10	16.27	.64	446.
66.000	17.90	23.81	.1558	-3.98	12.64	28.39	16.15	.65	423.
68.000	13.56	25.46	.1609	-4.34	14.14	28.58	15.41	.67	412.
70.000	6.25	26.29	.1359	-4.79	16.37	28.18	15.17	.65	400.

TABLE 11.1 THERMODYNAMIC STATISTICAL PARAMETERS, JANUARY

STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	MEAN P MB	S.D. P MB	SKEW P	MEAN T DEG K	S.D. T DEG K	SKEW T	MEAN D G/M3	S.D. D G/M3	SKEW D	NOBS P	NOBS T	NOBS D
.000	1010.1000	1.8509	.08	301.39	1.09	-1.35	1155.0000	4.7440	.80	413.	413.	413.
.002	1009.8000	1.8371	.08	301.34	1.11	-1.29	1155.0000	4.7960	.74	429.	429.	429.
1.000	901.3000	1.6237	.03	292.75	.90	-.12	1065.0000	4.1210	.08	429.	429.	429.
2.000	802.2400	1.5166	.02	288.68	[illegible]	-.15	963.9000	5.0500	.27	429.	429.	429.
3.000	712.6500	1.4419	-.23	284.78	1.37	-.19	869.4000	3.9630	.02	429.	429.	429.
4.000	631.7900	1.3636	-.30	279.45	1.36	.04	786.0000	3.8620	-.28	428.	428.	428.
5.000	558.8300	1.2977	-.36	273.86	1.32	-.14	709.8000	3.6120	-.32	429.	428.	428.
6.000	493.0600	1.2480	-.40	269.07	1.28	.01	639.8000	3.2110	-.57	425.	425.	425.
7.000	433.5600	1.1749	-.43	262.01	1.27	-.33	575.6000	2.9330	-.56	423.	423.	423.
8.000	380.2800	1.1905	-.57	255.70	1.27	-.80	517.4000	2.5790	-.64	406.	406.	406.
9.000	332.2600	1.1587	-.64	248.77	1.36	-.77	464.7000	2.5830	-1.10	397.	397.	397.
10.000	289.3000	1.2011	-.55	241.12	1.39	-.59	417.5000	2.3030	-1.12	380.	380.	380.
11.000	250.8400	1.1675	-.68	233.18	1.38	-.39	374.5000	1.9130	-1.67	379.	379.	379.
12.000	216.0200	1.1709	-.59	224.93	1.35	-.27	334.6000	1.1010	-.04	372.	372.	372.
13.000	185.4100	1.1462	-.56	216.74	1.35	.00	298.0000	1.0420	-.33	367.	367.	367.
14.000	158.0200	1.0952	-.43	208.61	1.33	-.11	263.9000	1.1180	-.24	364.	364.	364.
15.000	133.8900	1.0303	-.44	201.01	1.32	-.15	232.0000	1.3590	-.40	353.	353.	353.
16.000	112.7500	.8844	-.60	194.38	1.41	-.23	202.1000	1.5410	-.36	278.	278.	278.
17.000	94.6010	.7781	-.59	190.53	1.80	.36	173.0000	2.1350	-.44	274.	274.	274.
18.000	79.1300	.6480	-.38	192.16	3.35	.12	143.5000	2.9090	-.09	274.	274.	274.
19.000	66.5480	.5076	-.34	199.15	2.78	-.14	116.4000	1.9130	.05	270.	270.	270.
20.000	56.2880	.4235	-.25	204.65	2.30	-.07	95.8300	1.3099	.14	267.	267.	267.
21.000	47.8080	.3679	-.09	208.66	2.08	-.09	79.8200	.9487	.09	253.	253.	253.
22.000	40.6920	.3300	.00	211.81	2.07	-.05	66.9300	.7519	.35	253.	253.	253.
23.000	34.7350	.2873	-.04	214.53	1.86	.44	56.4100	.5516	-.21	243.	243.	243.
24.000	29.6890	.2588	-.07	217.03	2.39	.45	47.6600	.5919	-.14	248.	248.	248.
25.000	25.4300	.2389	.05	218.98	2.57	.17	40.4600	.5199	-.07	245.	245.	245.
26.000	21.8170	.2143	.00	221.16	2.29	.03	34.3700	.4175	.28	238.	238.	238.
27.000	18.7430	.1914	.08	223.33	2.26	.24	29.2400	.3560	.20	211.	211.	211.
28.000	16.1230	.1724	.08	225.13	2.23	.18	24.9500	.3115	.14	210.	210.	210.
29.000	13.6910	.1456	-.06	226.93	2.28	.13	21.3300	.2874	.07	187.	187.	187.
30.000	11.9830	.1323	-.01	228.90	2.15	.03	18.2400	.2356	-.10	186.	186.	186.
32.000	8.6841	.1298	-.26	232.37	3.52	.19	13.3300	.1931	.65	70.	70.	68.
34.000	6.6664	.1031	.43	236.97	3.58	.28	9.8120	.1672	-.03	69.	70.	68.
36.000	5.0329	.0826	.74	241.77	3.69	.61	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	69.
38.000	3.8219	.0710	.75	247.76	4.14	-.18	5.3760	.0945	.07	69.	70.	69.
40.000	2.9215	.0603	.64	253.26	3.80	.32	4.0190	.0802	.47	69.	70.	69.
42.000	2.2451	.0502	.68	257.39	4.08	.33	3.0390	.0629	.39	69.	71.	69.
44.000	1.7332	0418	.67	262.12	3.90	-.27	2.3030	.0486	.34	69.	71.	69.
46.000	1.3440	.0348	.68	266.82	4.75	.25	1.7540	.0453	.39	68.	67.	66.
48.000	1.0468	.0298	.59	270.54	6.06	.29	1.3470	.0296	.31	68.	65.	68.
50.000	.8169	.0256	.56	271.96	6.52	-.16	1.0460	.0269	.60	67.	64.	67.
52.000	.6385	.0219	.50	271.71	5.07	-.19	.8191	.0223	.41	67.	65.	67.
54.000	.4986	.0184	.47	270.23	4.35	.03	.6422	.0211	.52	65.	60.	65.
56.000	.3882	.0148	.49	267.35	4.62	.13	.5053	.0171	.28	63.	62.	63.
58.000	.3015	.0116	.51	264.81	5.34	-.31	.3965	.0130	.30	59.	60.	59.
60.000	.2337	.0098	.36	261.86	6.48	-.09	.3107	.0108	.49	51.	53.	51.
62.000	.1796	.0079	.22	258.76	7.83	-.29	.2415	.0086	.14	38.	40.	33.
64.000	.1379	.0072	.24	254.75	9.95	.33	.1880	.0053	.29	28.	29.	28.
66.000	.1042	.0055	1.03	248.80	7.51	-.22	.1460	.0053	.54	13.	14.	13.
68.000	.0796	.0059	.70	246.38	13.96	-.49	.1125	.0051	.40	9.	9.	9.
70.000	.0621	.0055	.45	246.83	18.27	-.10	.0876	.0041	.61	6.	6.	6.

TABLE 11. 2 THERMODYNAMIC STATISTICAL PARAMETERS, FEBRUARY

STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	MEAN P MB	S.D. P MB	SKEW P	MEAN T DEG K	S.D. T DEG K	SKEW T	MEAN D G/M3	S.D. D G/M3	SKEW D	NOBS P	NOBS T	NOBS D
.000	1010.4000	1.7409	-.15	301.68	1.11	-1.13	1154.0000	4.9530	.65	377.	377.	377.
.002	1010.1000	1.7471	-.15	301.66	1.10	-1.11	1154.0000	4.9590	.66	392.	392.	392.
1.000	901.6000	1.5627	-.07	292.71	.88	-.25	1066.0000	3.9700	.18	392.	392.	392.
2.000	802.4800	1.4540	-.16	288.81	1.47	.06	963.8000	4.5130	-.03	392.	392.	392.
3.000	712.8900	1.3619	-.25	284.72	1.28	-.43	869.8000	3.8900	.05	392.	392.	392.
4.000	632.0000	1.3133	-.33	279.45	1.30	.06	786.3000	3.6250	-.43	392.	392.	392.
5.000	558.9900	1.2632	-.28	273.87	1.30	.32	709.8000	3.4410	-.37	392.	392.	392.
6.000	493.2000	1.2345	-.18	268.13	1.18	.04	639.8000	2.9400	-.15	391.	391.	391.
7.000	433.7100	1.2200	-.02	262.14	1.27	.08	575.5000	2.5270	-.25	388.	388.	388.
8.000	380.4000	[illegible]	-.05	255.76	1.24	.11	517.4000	[illegible]	-.49	380.	380.	380.
9.000	332.4400	1.2202	.03	248.89	1.29	.27	464.7000	2.3440	-.92	367.	367.	367.
10.000	289.5100	1.2297	.10	241.22	1.35	.21	417.6000	2.1950	-1.31	352.	352.	352.
11.000	251.0300	1.1814	.09	233.18	1.36	-.01	374.8000	1.9860	-1.70	347.	347.	347.
12.000	216.2000	1.1838	.12	224.97	1.35	-.03	334.8000	1.1390	.57	342.	342.	342.
13.000	185.5700	1.1725	.15	216.77	1.37	.04	298.2000	1.0790	.49	338.	338.	338.
14.000	158.1700	1.1321	.25	208.71	1.36	-.01	264.0000	1.1860	.15	335.	335.	335.
15.000	134.0400	1.0591	.26	201.20	1.37	-.04	232.1000	1.3520	.04	330.	330.	330.
16.000	113.0000	1.0025	.35	194.94	1.38	.08	201.9000	1.6810	-.07	248.	248.	248.
17.000	94.8610	.8739	.33	191.26	1.72	-.01	172.8000	2.2910	.25	248.	248.	248.
18.000	79.4190	.7251	.46	192.88	2.96	-.04	143.5000	2.9320	.19	248.	248.	248.
19.000	66.8280	.5396	.33	199.33	2.71	-.26	116.8000	2.0240	.40	247.	247.	247.
20.000	56.5190	.4356	.32	204.59	2.54	-.27	96.2500	1.4520	.35	245.	245.	245.
21.000	47.9940	.3693	.31	208.57	2.41	-.48	80.1700	1.0790	.53	236.	236.	236.
22.000	40.8570	3292	.36	212.13	2.26	-.22	67.1000	.8113	.40	236.	236.	236.
23.000	34.8860	.2907	.50	215.01	1.99	.03	56.5300	.6027	.20	227.	227.	227.
24.000	29.8270	.2542	.63	217.76	2.30	.31	47.7200	.5778	-.09	225.	225.	225.
25.000	25.5610	.2341	.61	219.84	2.51	.07	40.5100	.4990	.14	225.	225.	225.
26.000	21.9360	.2140	.59	221.90	2.30	.17	34.4400	.3708	.17	219.	219.	219.
27.000	18.8550	.1928	.67	223.87	2.49	.08	29.3400	.3350	.05	204.	204.	204.
28.000	16.2260	.1802	.66	225.81	2.58	.23	25.0300	.2790	.05	204.	204.	204.
29.000	13.9760	.1582	-.02	227.67	2.72	.16	21.3900	.2429	.02	189.	189.	189.
30.000	12.0660	.1481	-.06	229.75	2.62	.01	18.3000	.1974	.13	186.	186.	186.
32.000	8.9409	.1493	.29	234.70	3.59	.44	13.2800	.2122	.13	60.	63.	59.
34.000	6.7308	.1234	.44	239.38	4.18	-.01	9.7990	.1565	.95	59.	63.	59.
36.000	5.0913	.1096	.45	245.60	4.74	.16	7.2250	.1269	.62	59.	64.	59.
38.000	3.8868	.0970	.40	252.07	4.58	-.35	5.3740	.1041	.31	59.	64.	59.
40.000	2.9854	.0830	.40	258.11	4.49	-.10	4.0300	.0877	.15	59.	64.	59.
42.000	2.3059	.0705	.47	263.03	4.12	.02	3.0540	.0706	.01	59.	63.	59.
44.000	1.7899	.0596	.51	268.00	5.23	.32	2.3250	.0649	.02	59.	63.	59.
46.000	1.3957	.0506	.55	272.04	4.83	.08	1.7850	.0505	.33	59.	61.	59.
48.000	1.0923	.0421	.58	274.44	4.72	-.06	1.3860	.0462	.40	59.	60.	59.
50.000	.8556	.0343	.56	274.96	3.59	-.39	1.0850	.0408	.57	59.	59.	59.
52.000	.6699	.0275	.52	272.94	4.37	-.09	.8554	.0349	.53	59.	59.	59.
54.000	.5235	.0220	.50	269.73	4.40	-.14	.6757	.0281	.23	58.	56.	58.
56.000	.4081	.0179	.52	266.25	3.83	-.51	.5334	.0204	.31	55.	58.	55.
58.000	.3159	.0142	.55	261.94	4.97	-.49	.4206	.0152	.56	53.	58.	53.
60.000	.2432	.0112	.57	257.72	5.66	-.11	.3289	.0104	.80	45.	48.	45.
62.000	.1862	.0098	.65	255.65	8.36	-.09	.2545	.0088	1.07	37.	41.	37.
64.000	.1421	.0080	.49	253.19	9.06	-.10	.1960	.0065	.77	30.	32.	30.
66.000	.1069	.0053	-.27	251.81	9.28	-.71	.1482	.0052	-.33	18.	20.	18.
68.000	.0831	.0050	-.70	251.09	12.69	-.95	.1154	.0034	-.29	12.	14.	12.
70.000	.0666	.0018	.55	255.53	5.48	.42	.0904	.0025	.61	6.	8.	6.

TABLE 11. 3 THERMODYNAMIC STATISTICAL PARAMETERS, MARCH

STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	MEAN P MB	S.D. P MB	SKEW P	MEAN T DEG K	S.D. T DEG K	SKEW T	MEAN D G/M3	S.D. D G/M3	SKEW D	NOBS P	NOBS T	NOBS D
.000	1011.0000	1.5427	-.14	301.91	1.17	-1.37	1154.0000	4.8060	1.50	405.	405.	405.
.002	1010.8000	1.5361	-.15	301.91	1.16	-1.35	1154.0000	4.7870	1.44	420.	420.	420.
1.000	902.3200	1.4095	-.20	293.19	.85	.11	1065.0000	3.9270	-.10	421.	421.	421.
2.000	803.2000	1.2698	-.21	288.68	1.15	.14	964.8000	3.7560	.13	421.	421.	421.
3.000	713.4600	1.2189	-.33	284.38	1.31	.28	871.4000	3.6200	-.31	421.	421.	421.
4.000	632.4100	1.1877	-.33	279.05	1.38	.15	787.8000	3.5400	-.24	421.	421.	421.
5.000	559.3100	1.1623	-.31	273.59	1.43	.27	711.0000	3.3310	-.56	421.	421	421.
6.000	493.4700	1.2090	-.22	268.06	1.50	-.09	640.4000	3.2680	-.26	421.	421.	421.
7.000	433.9200	1.2322	-.10	262.08	1.35	-.05	576.1000	2.7830	-.57	417.	417.	417.
8.000	380.6400	1.2197	-.09	255.77	1.32	-.33	517.9000	2.5270	-.37	405.	405.	405.
9.000	332.5800	1.2352	-.14	248.82	1.44	-.48	465.2000	2.4760	-.75	388.	388.	388.
10.000	289.6500	1.2551	-.04	241.20	1.50	-.21	417.9000	2.1380	-1.02	377.	377.	377.
11.000	251.1300	1.2257	-.03	233.15	1.51	-.24	375.0000	1.7810	-.71	375.	375.	375.
12.000	216.2700	1.2524	.06	224.87	1.48	-.17	335.0000	1.0870	-.22	367.	367.	367.
13.000	185.6300	1.2555	.05	216.69	1.47	-.20	298.4000	1.0140	-.84	360.	360.	360.
14.000	158.2300	1.2258	.09	208.62	1.40	-.25	264.2000	1.1460	-.87	354.	354.	354.
15.000	134.0600	1.1294	.07	201.20	1.23	.15	232.1000	1.4250	-.47	351.	351.	351.
16.000	112.9600	.9985	.21	195.04	1.39	.04	201.8000	1.9820	-.33	272.	272.	272.
17.000	94.8430	.8439	.27	191.54	2.05	-.01	172.5000	2.6260	.05	272.	272.	272.
18.000	79.4420	.6933	.23	193.26	3.47	.04	143.3000	3.1000	.23	274.	274.	274.
19.000	66.8510	.5323	-.12	199.78	2.83	-.01	116.6000	1.9640	.56	269.	269.	269.
20.000	56.5680	.4535	-.13	205.14	2.55	.11	96.0800	1.3130	.42	265.	265.	265.
21.000	48.0660	.4066	.03	209.49	2.31	.38	79.9400	.9293	.10	251.	251.	251.
22.000	40.9460	.3736	.20	213.03	2.23	.02	66.9700	.7824	-.22	250.	250.	250.
23.000	34.9800	.3321	.26	215.85	1.75	-.11	56.4600	.5988	-.28	241.	241.	241.
24.000	29.9170	.2908	.37	218.33	2.25	-.04	47.7400	.6122	-.16	245.	245.	245.
25.000	25.6530	.2692	.39	220.55	2.17	-.31	40.5200	.4796	-.02	243.	243.	243.
26.000	22.0290	.2446	.28	222.75	2.17	-.65	34.4500	.3971	.10	234.	234.	234.
27.000	18.9440	.2257	.26	224.82	2.09	-.62	29.3600	.3495	.25	205.	205.	205.
28.000	16.3150	.2038	.13	226.87	2.13	-.57	25.0500	.3064	.41	203.	203.	203.
29.000	14.0750	.1339	-.06	229.08	2.09	.08	21.4000	.2763	.54	174.	174.	174.
30.000	12.1600	.1678	-.15	231.22	1.94	.21	18.3200	.2295	.35	172.	172.	172.
32.000	8.9911	.1344	-.72	235.41	3.67	.60	13.3200	.2150	-.45	66.	67.	65.
34.000	6.7742	.1135	-.68	240.64	3.70	.13	9.8110	.1574	-.38	65.	67.	66.
36.000	5.1318	.1029	-.60	246.36	4.49	-.11	7.2570	.0985	.58	65.	66.	65.
38.000	3.9224	.0889	-.66	253.48	5.51	-.63	5.3920	.1272	-.15	65.	66.	65.
40.000	3.0193	.0762	-.70	260.88	4.69	-.40	4.0320	.0808	-.14	64.	65.	64.
42.000	2.3411	.0667	-.70	266.09	4.40	.10	3.0630	.0642	-.50	64.	62.	64.
44.000	1.8215	.0573	-.61	269.85	4.56	-.23	2.3510	.0600	-.73	63.	61.	63.
46.000	1.4223	.0467	-.53	272.43	3.80	.38	1.8190	.0565	-.60	63.	56.	63.
48.000	1.1123	.0374	-.49	274.18	3.55	-.02	1.4140	.0480	-.52	62.	59.	62.
50.000	.8703	.0296	-.50	272.89	3.28	.20	1.1110	.0377	-.40	62.	59.	62.
52.000	.6802	.0238	-.48	270.75	3.86	-.25	.8743	.0288	-.64	62.	58.	62.
54.000	.5293	.0200	-.31	267.96	4.11	.70	.6878	.0250	-.60	62.	64.	62.
56.000	.4123	.0158	-.30	264.68	3.85	-.22	.5424	.0181	-.48	59.	61.	59.
58.000	.3186	.0135	-.11	261.66	4.50	.00	.4244	.0154	-.28	54.	56.	54.
60.000	.2454	.0110	-.03	258.67	5.73	-.29	.3310	.0125	-.01	45.	47.	45.
62.000	.1864	.0080	-.13	255.00	6.34	-.18	.2546	.0080	.24	31.	31.	31.
64.000	.1425	.0061	-.49	251.28	6.95	-.16	.1976	.0065	-.17	23.	26.	26.
66.000	.1092	.0053	-.30	251.25	7.35	-.21	.1514	.0056	-.29	22.	22.	22.
68.000	.0834	.0043	-.17	249.87	8.15	-.10	.1163	.0046	-.75	17.	17.	17.
70.000	.0635	.0039	-.43	248.87	5.47	-.30	.0882	.0039	-.19	7.	7.	7.

TABLE 11. 4 THERMODYNAMIC STATISTICAL PARAMETERS, APRIL
STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	MEAN P MB	S.D. P MB	SKEW P	MEAN T DEG K	S.D. T DEG K	SKEW T	MEAN D G/M3	S.D. D G/M3	SKEW D	NOBS P	NOBS T	NOBS D
.000	1010.9000	1.4764	-.22	301.69	1.40	-.97	1154.0000	5.6050	.98	418.	418.	418.
.002	1010.7000	1.4748	-.23	301.68	1.40	-.98	1154.0000	5.6970	1.05	428.	428.	428.
1.000	902.3700	1.3768	-.32	293.56	.79	-.17	1063.0000	3.5860	-.06	428.	428.	428.
2.000	803.3700	1.2797	-.51	288.65	1.07	.25	963.9000	3.4250	-.39	428.	428.	428.
3.000	713.6600	1.2111	-.54	284.05	1.14	.11	872.1000	2.9200	-.24	428.	428.	428.
4.000	632.5400	1.1971	-.37	278.56	1.04	-.07	789.0000	2.5300	-.20	428.	429.	428.
5.000	559.3300	1.1323	-.35	273.07	1.05	.24	712.2000	2.5050	-.52	428.	428.	428.
6.000	493.4000	1.0910	-.29	267.63	1.08	.22	641.3000	2.3410	-.41	428.	428.	428.
7.000	433.7900	1.0984	-.10	261.65	1.13	.10	576.9000	2.2020	-.31	426.	426.	426.
8.000	380.4600	1.0647	-.13	255.40	1.19	-.02	518.5000	2.1020	-.33	420.	420.	420.
9.000	332.4200	1.0814	.04	248.55	1.27	.29	465.6000	2.0480	-1.12	414.	414.	414.
10.000	289.4100	1.0821	.05	240.90	1.30	.21	418.3000	1.6310	-1.06	398.	398.	398.
11.000	250.8800	1.0646	.09	232.85	1.33	.14	375.3000	1.3300	.10	398.	398.	398.
12.000	216.0100	1.0341	.15	224.48	1.37	.03	335.2000	1.1100	.20	385.	385.	385.
13.000	185.3200	1.1056	.19	216.16	1.49	-.09	298.7000	1.1310	.49	375.	375.	375.
14.000	157.9000	1.0862	.24	208.13	1.54	-.20	264.3000	1.2130	.21	370.	370.	370.
15.000	133.7600	1.0331	.25	201.01	1.40	-.15	231.8000	1.4820	-.48	365.	365.	365.
16.000	112.8400	.9626	.12	195.53	1.35	-.09	201.0000	1.8750	-.10	277.	277.	277.
17.000	94.7810	.8144	.08	192.50	1.76	-.02	171.5000	2.2220	.16	269.	269.	269.
18.000	79.4750	.6885	.08	194.34	2.58	-.05	142.5000	2.4590	.18	268.	268.	268.
19.000	66.9490	.5413	-.04	200.71	2.55	.08	116.2000	1.7760	.21	266.	266.	266.
20.000	56.6910	.4598	-.11	206.38	2.10	.13	95.7000	1.0890	.27	260.	260.	260.
21.000	48.2170	.4133	-.06	210.60	1.96	.10	79.7600	.8500	.06	250.	250.	250.
22.000	41.1070	.3761	-.03	213.81	2.09	.33	66.9800	.7571	-.36	249.	249.	249.
23.000	35.1370	.3354	.00	216.53	1.86	.13	56.5300	.5810	-.25	244.	244.	244.
24.000	30.0590	.2989	.05	219.07	2.25	.34	47.8200	.5482	-.48	244.	244.	244.
25.000	25.7990	.2720	.11	221.50	2.17	.12	40.5800	.4795	-.52	239.	239.	239.
26.000	22.1620	.2449	.16	223.95	1.94	.06	34.4700	.3562	.00	227.	227.	227.
27.000	19.0890	.2078	.30	226.33	1.91	-.08	29.3800	.3095	.21	193.	193.	193.
28.000	16.4560	.1897	.27	228.21	1.67	-.19	25.1200	.2656	.17	190.	190.	190.
29.000	14.2010	.1693	.23	230.11	1.73	.00	21.5000	.2451	.22	163.	163.	163.
30.000	12.2790	.1547	.21	232.16	1.46	-.30	18.4300	.2064	.05	160.	160.	160.
32.000	9.0913	.1222	-.28	236.41	2.44	.37	13.4000	.1895	-.06	50.	55.	50.
34.000	6.8465	.1057	-.14	241.59	3.12	.35	9.8870	.1378	-.87	51.	56.	50.
36.000	5.1929	.0938	.00	248.01	3.93	.22	7.3070	.1431	-.31	50.	55.	49.
38.000	3.9762	.0651	.14	255.74	4.15	.10	5.4200	.1118	-.40	50.	55.	50.
40.000	3.0662	.0557	.55	261.63	3.98	-.52	4.0820	.0913	-.08	50.	55.	50.
42.000	2.3789	.0440	.58	266.25	3.53	.12	3.1110	.0630	.29	50.	55.	50.
44.000	1.8508	.0366	.63	268.98	3.89	.75	2.3970	.0451	.36	50.	49.	50.
46.000	1.4429	.0311	.66	270.61	3.82	.51	1.8560	.0321	.14	50.	49.	50.
48.000	1.1267	.0268	.73	271.54	4.07	.43	1.4440	.0278	.24	50.	47.	50.
50.000	.8800	.0224	.72	271.22	4.18	.04	1.1310	.0275	.51	50.	52.	50.
52.000	.6866	.0188	.68	269.38	4.89	.15	.8877	.0197	.55	50.	51.	50.
54.000	.5342	.0169	.49	267.42	4.57	.03	.6960	.0160	-.06	50.	53.	50.
56.000	.4161	.0142	.55	264.49	5.02	-.03	.5481	.0127	.29	48.	52.	48.
58.000	.3224	.0128	.53	260.12	6.47	.31	.4317	.0110	.06	45.	49.	45.
60.000	.2471	.0119	.87	255.10	7.50	.20	.3370	.0095	.54	32.	34.	32.
62.000	.1836	.0058	.98	245.26	7.05	-.09	.2609	.0054	.62	19.	21.	19.
64.000	.1390	.0052	.87	239.90	7.89	.07	.2017	.0032	.42	17.	19.	17.
66.000	.1049	.0056	.69	235.59	12.80	.09	.1546	.0038	-.89	13.	14.	13.
68.000	.0792	.0057	.72	235.60	16.39	-.39	.1172	.0050	-.27	9.	9.	9.
70.000	.9999	.0000	99.99	999.99	99.99	99.99	.9999	.0000	99.99	3.	3.	3.

TABLE II. 5 THERMODYNAMIC STATISTICAL PARAMETERS, MAY

STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	MEAN P MB	S.D. P MB	SKEW P	MEAN T DEG K	S.D. T DEG K	SKEW T	MEAN D G/M3	S.D. D G/M3	SKEW D	NOBS P	NOBS T	NOBS D
.000	1010.8000	1.3278	-.04	301.69	1.30	-1.09	1154.0000	5.5960	1.04	438.	438.	438.
.002	1010.6000	1.3313	-.05	301.68	1.29	-1.09	1154.0000	5.5800	1.04	440.	440.	440.
1.000	902.3800	1.1908	-.13	293.89	.84	-.43	1062.0000	3.5490	.45	441.	441.	441.
2.000	803.5100	1.0240	-.14	289.10	1.07	-.03	962.9000	3.5290	.15	441.	441.	441.
3.000	713.9100	.9901	-.17	284.12	1.02	-.10	871.9000	2.8270	.10	440.	440.	440.
4.000	632.7900	.9978	-.01	278.50	1.02	.08	789.3000	2.5020	.05	440.	440.	440.
5.000	559.5500	.9837	-.01	272.96	.95	-.30	712.7000	2.0490	.36	440.	440.	440.
6.000	493.5300	1.0036	-.14	267.45	1.05	-.56	642.0000	2.0540	.35	440.	440.	440.
7.000	433.9400	1.0321	-.14	261.55	1.12	-.22	577.5000	1.9540	.00	438.	438.	438.
8.000	380.5200	1.0475	-.35	255.27	1.16	-.06	519.0000	1.6850	-.37	431.	431.	431.
9.000	332.4200	1.0819	-.29	248.29	1.27	-.08	466.2000	1.5530	-.15	425.	425.	425.
10.000	289.3800	1.1201	-.32	240.67	1.36	.04	418.8000	1.4120	-.19	414.	414.	414.
11.000	250.8300	1.1105	-.30	232.65	1.36	-.13	375.6000	1.3540	-.09	411.	411.	411.
12.000	215.9500	1.1380	-.20	224.34	1.35	-.16	335.3000	1.0510	-.14	395.	395.	395.
13.000	185.2800	1.1182	-.20	216.08	1.37	-.30	298.7000	1.1030	-.55	389.	389.	389.
14.000	157.8500	1.0848	-.16	208.10	1.39	-.41	264.3000	1.2670	-.60	376.	376.	376.
15.000	133.7200	.9987	-.11	201.06	1.41	.17	231.7000	1.5730	-.37	370.	370.	370.
16.000	112.7400	.8543	.11	196.07	1.53	.16	200.3000	1.7350	-.21	281.	281.	281.
17.000	94.7750	.7564	.24	194.12	1.80	-.04	170.1000	1.8600	-.03	277.	277.	277.
18.000	79.6160	.6832	.38	196.62	2.00	-.18	141.1000	1.8400	.31	274.	274.	274.
19.000	67.1710	.5608	.32	202.24	2.06	-.29	115.7000	1.5140	.61	272.	272.	272.
20.000	56.9450	.4303	.29	207.27	1.88	-.32	95.7200	1.1390	.58	269.	269.	269.
21.000	48.4510	.4160	.16	211.13	1.75	-.07	79.9500	.8336	.43	252.	252.	252.
22.000	41.3200	.3727	.20	214.03	1.80	.09	67.2600	.7290	-.30	252.	252.	252.
23.000	35.3060	.3192	.35	216.67	1.70	.16	56.7700	.5837	-.08	238.	238.	238.
24.000	30.2110	.2847	.44	219.26	1.99	-.01	48.0000	.5210	-.10	240.	240.	240.
25.000	25.9140	.2389	.33	221.90	1.89	.18	40.6900	.4204	-.10	232.	232.	232.
26.000	22.2570	.1982	.22	224.34	1.65	.28	34.5600	.3360	-.02	218.	218.	218.
27.000	19.1510	.1706	.11	226.58	1.64	-.06	29.4500	.2918	.26	195.	195.	195.
28.000	16.5150	.1526	.07	228.68	1.66	.01	25.1600	.2600	.25	191.	191.	191.
29.000	14.2560	.1308	-.06	230.68	1.85	-.04	21.5300	.2324	.45	172.	172.	172.
30.000	12.3300	.1173	-.13	232.58	1.73	-.17	18.4700	.1893	.11	167.	167.	167.
32.000	9.2047	.0944	-.22	236.92	3.02	.06	13.5400	.1668	-.34	69.	70.	69.
34.000	6.9383	.0809	-.08	240.95	2.87	.25	10.0300	.1348	-.33	69.	70.	69.
36.000	5.2561	.0751	-.51	245.80	3.63	.65	7.4[illegible]	.1049	-.47	[illegible]	70.	[illegible]
38.000	4.0110	.0608	-.29	251.72	4.37	.33	5.5550	.0870	-.21	69.	70.	69.
40.000	3.0777	.0535	.03	258.45	3.82	.42	4.1530	.0720	-1.00	69.	70.	69.
42.000	2.3806	.0429	.19	262.83	3.25	-.02	3.1560	.0587	.15	68.	69.	68.
44.000	1.9462	.0355	.11	266.94	3.52	-.03	2.4080	.0421	.18	69.	67.	69.
46.000	1.4369	.0308	.13	268.46	4.11	.14	1.8630	.0286	-.39	69.	66.	69.
48.000	1.1195	.0270	.15	268.85	4.07	.02	1.4500	.0259	-.14	69.	68.	69.
50.000	.8724	.0232	.20	267.81	4.22	.50	1.1350	.0226	-.18	68.	68.	68.
52.000	.6788	.0200	.28	266.71	4.89	.16	.8870	.0188	-.42	68.	69.	68.
54.000	.5275	.0174	.34	263.71	5.18	.42	.6951	.0158	-.01	68.	65.	68.
56.000	.4078	.0144	.29	261.37	5.38	-.08	.5431	.0131	.07	66.	67.	66.
58.000	.3143	.0118	.18	258.13	6.18	.04	.4242	.0096	.22	62.	64.	62.
60.000	.2399	.0100	.24	252.92	6.70	.06	.3305	.0082	-.01	49.	50.	49.
62.000	.1831	.0086	.44	248.61	6.82	.38	.2565	.0085	-.40	43.	44.	43.
64.000	.1390	.0068	.38	243.90	7.56	.17	.1986	.0062	-.35	38.	39.	38.
66.000	.1058	.0058	.41	241.90	9.19	.06	.1523	.0062	-.10	34.	35.	34.
68.000	.0808	.0053	.07	242.66	11.66	-.42	.1159	.0049	-.28	23.	24.	23.
70.000	.0628	.0036	-.48	244.23	11.06	-1.04	.0894	.0037	-.46	13.	14.	13.

TABLE II. 6 THERMODYNAMIC STATISTICAL PARAMETERS, JUNE
STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	MEAN P MB	S.D. P MB	SKEW P	MEAN T DEG K	S.D. T DEG K	SKEW T	MEAN D G/M3	S.D. D G/M3	SKEW D	NOBS P	NOBS T	NOBS D
.000	1010.9000	1.3706	.04	301.77	1.24	-1.29	1154.0000	5.4250	1.08	394.	394.	394.
.002	1010.7000	1.3669	.03	301.74	1.25	-1.28	1154.0000	5.5130	1.07	398.	398.	398.
1.000	902.5200	1.2619	.09	293.94	.74	-.10	1062.0000	3.1360	-.14	399.	399.	399.
2.000	803.6100	1.0904	-.15	288.95	1.00	.28	963.7000	3.1330	.16	399.	399.	399.
3.000	713.9200	1.0621	-.53	283.94	1.06	-.02	872.6000	2.8490	.16	399.	399.	399.
4.000	632.7900	1.0738	-.57	278.35	1.08	.18	789.8000	2.6570	-.47	399.	399.	399.
5.000	559.4400	1.0485	-.61	272.76	1.00	.34	713.1000	2.2640	-.91	399.	399.	399.
6.000	493.4000	1.0272	-.57	267.20	1.00	.26	642.4000	2.1790	-.93	395.	395.	395.
7.000	433.7900	1.0168	-.36	261.23	1.07	.26	577.9000	2.1800	-.99	389.	389.	389.
8.000	380.3100	1.0134	-.37	254.85	1.13	.20	519.5000	2.1090	-1.48	387.	387.	387.
9.000	332.1900	1.0273	-.11	247.89	1.28	.08	466.6000	2.1400	-2.22	377.	377.	377.
10.000	289.1200	1.0632	-.01	240.25	1.34	.10	419.0000	2.0100	-3.88	366.	366.	366.
11.000	250.5700	1.0343	.18	232.12	1.37	.11	376.0000	1.3670	-.12	360.	360.	360.
12.000	215.6400	1.0561	.22	223.76	1.36	.18	335.7000	1.0330	.04	356.	356.	356.
13.000	184.9600	1.0501	.30	215.45	1.41	.14	299.1000	1.0540	.29	348.	348.	348.
14.000	157.5200	1.0296	.39	207.55	1.47	.22	264.4000	1.1790	-.30	341.	341.	341.
[illegible]	133.4200	.9664	.46	200.81	1.65	.04	231.5000	1.6260	-.21	337.	337.	337.
[illegible]	112.5100	.9293	.34	196.63	1.70	.13	199.3000	1.8720	.07	254.	254.	254.
[illegible]	94.6690	.8000	.35	196.00	2.18	.08	168.3000	2.3690	.29	250.	250.	250.
18.000	79.7100	.6928	.42	199.60	2.42	-.08	139.1000	2.0090	.50	249.	249.	249.
19.000	67.3980	.5680	.30	204.14	1.95	-.23	115.0000	1.4960	.60	249.	249.	249.
20.000	57.2000	.4871	.25	208.36	1.70	.01	95.6400	1.0410	.45	247.	247.	247.
21.000	48.7040	.4272	.20	211.79	1.67	-.14	80.1200	.7722	.06	236.	236.	236.
22.000	41.5530	.3885	.20	214.27	1.82	-.09	67.5600	.6805	-.16	235.	235.	235.
23.000	35.5170	.3419	.27	216.81	1.66	-.17	57.0700	.5350	.05	229.	229.	229.
24.000	30.3990	.3133	.26	219.42	1.89	.07	48.2700	.4950	.12	228.	228.	228.
25.000	26.0880	.2767	.19	221.82	1.83	.05	40.9700	.4370	.10	228.	228.	228.
26.000	22.4070	.2433	.27	224.13	1.72	-.23	34.8300	.3685	.35	217.	217.	217.
27.000	19.2880	.2165	.29	226.45	1.84	.02	29.6700	.3295	.24	187.	187.	187.
28.000	16.6290	.1945	.22	228.48	1.78	-.29	25.3500	.2817	.42	184.	184.	184.
29.000	14.3530	.1759	.15	230.44	2.01	-.06	21.7000	.2602	.33	164.	164.	164
30.000	12.4070	.1588	.09	231.89	2.12	-.15	18.6400	.2412	.22	163.	163.	163.
32.000	9.2212	.1167	.45	235.16	3.95	1.09	13.6700	.2007	-.13	65.	67.	63.
34.000	6.9398	.1046	1.05	238.92	3.44	.80	10.1200	.1291	.06	64.	68.	63.
36.000	5.2473	.0957	.69	244.56	3.60	.13	7.4700	.1518	-.91	63.	67.	63.
38.000	4.0031	.0714	1.65	250.92	3.55	.44	5.5540	.0963	.34	63.	68.	63.
40.000	3.0684	.0607	1.52	255.57	3.65	.24	4.1800	.0638	.51	63.	68.	63.
42.000	2.3637	.0529	1.58	259.82	4.09	.44	3.1690	.0522	.02	63.	68.	63.
44.000	1.8291	.0451	1.56	264.81	3.75	-.29	2.4060	.0511	.82	63.	68.	63.
46.000	1.4220	.0379	1.52	267.21	4.30	.67	1.8500	.0387	.19	62.	61.	62.
48.000	1.1069	.0325	1.58	268.27	4.29	.49	1.4370	.0327	.67	62.	66.	62.
50.000	.8623	.0273	1.50	268.22	4.20	.49	1.1180	.0300	1.00	62.	63.	62.
52.000	.6713	.0227	1.51	266.40	4.73	-.17	.8773	.0250	1.26	62.	66.	62.
54.000	.5219	.0195	1.29	265.32	6.25	.21	.6848	.0213	.99	60.	64.	60.
56.000	.4046	.0165	1.26	262.31	6.31	.00	.5355	.0161	.97	56.	58.	56.
58.000	.3128	.0146	1.12	259.00	7.02	-.12	.4195	.0130	.53	53.	56.	53.
60.000	.2393	.0136	1.36	254.92	7.43	.12	.3265	.0120	.90	39.	42.	39.
62.000	.1810	.0091	1.34	249.85	7.93	-.12	.2523	.0083	1.32	28.	30.	28.
64.000	.1369	.0054	.15	243.78	9.48	-.17	.1956	.0051	.24	25.	26.	25.
66.000	.1053	.0047	-.26	241.69	9.72	-.77	.1518	.0042	.22	19.	19.	19.
68.000	.0805	.0044	-.59	241.83	3.69	-.73	.1159	.0034	-.30	12.	12.	12.
70.000	.0522	.0019	-.90	249.56	4.09	-.37	.0872	.0015	-.65	6.	6.	6.

TABLE II. 7 THERMODYNAMIC STATISTICAL PARAMETERS, JULY
STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	MEAN P MB	S.D. P MB	SKEW P	MEAN T DEG K	S.D. T DEG K	SKEW T	MEAN D G/M3	S.D. D G/M3	SKEW D	NOBS P	NOBS T	NOBS D
.000	1010.3000	1.4185	.00	301.70	1.26	-1.16	1153.0000	5.6670	.98	399.	399.	399.
.002	1010.0000	1.4161	.00	301.69	1.26	-1.16	1153.0000	5.6590	.98	400.	400.	400.
1.000	901.9300	1.3230	-.04	294.01	.74	-.32	1061.0000	3.1210	.05	400.	400.	400.
2.000	803.1500	1.1363	-.19	288.94	.93	.00	963.0000	3.1600	-.08	400.	400.	400.
3.000	713.5600	1.0996	-.17	283.92	.94	-.17	872.1000	2.8540	.09	400.	400.	400.
4.000	632.4200	1.0617	-.20	278.30	.94	.08	783.4000	2.6200	-.03	400.	400.	400.
5.000	559.1600	.9435	-.23	272.75	.95	-.41	712.7000	2.3620	.54	400.	400.	400.
6.000	493.1500	.8893	-.29	267.24	.90	-.03	642.0000	1.9920	-.04	400.	400.	400.
7.000	433.5400	.9287	-.10	261.32	.95	-.04	577.4000	1.9320	.10	398.	398.	398.
8.000	380.1500	.8420	-.21	254.93	.98	-.02	519.2000	1.7320	.13	394.	394.	394.
9.000	332.0600	.8063	-.25	247.92	1.08	-.14	466.5000	1.6900	.22	382.	382.	382.
10.000	288.9800	.8653	-.21	240.22	1.22	-.13	419.0000	1.5000	.11	367.	367.	367.
11.000	250.4400	.8625	-.21	232.14	1.31	-.03	375.8000	1.3730	.09	358.	358.	358.
12.000	215.5100	.8851	-.09	223.67	1.31	.05	335.7000	1.0710	.21	352.	352.	352.
13.000	184.8200	.9017	.02	215.34	1.32	.16	299.0000	.9265	.03	341.	341.	341.
14.000	157.3700	.8871	.09	207.32	1.38	.26	264.4000	[illegible]	-.36	335.	335.	335.
15.000	133.2600	.8459	.09	200.54	1.50	-.26	231.5000	1.5990	-.04	334.	334.	334.
16.000	112.3600	.7887	-.07	196.84	1.75	-.45	198.9000	2.1120	.21	269.	269.	269.
17.000	94.5810	.6550	-.16	197.39	2.27	-.28	166.9000	[illegible]	.40	263.	263.	263.
18.000	79.7810	.5251	-.22	202.28	2.24	.41	137.4000	[illegible]	.21	261.	261.	261.
19.000	67.6050	.4329	-.35	206.44	1.81	.08	114.1000	1.2360	.03	256.	255.	256.
20.000	57.4570	.3716	-.41	209.84	1.65	.07	95.3900	.8081	.17	249.	249.	249.
21.000	48.9490	.3336	-.34	212.45	1.82	-.06	80.2700	.7204	-.01	239.	239.	239.
22.000	41.7800	.3087	-.29	214.64	1.82	.02	67.8100	.5801	-.44	238.	238.	238.
23.000	35.7230	.2804	-.26	216.89	1.82	.14	57.3800	.4805	-.27	226.	226.	226.
24.000	30.5760	.2604	-.27	219.19	2.08	.21	48.6000	.4862	.14	224.	224.	224.
25.000	26.2300	.2406	-.26	221.58	1.94	.01	41.2400	.3758	.20	217.	217.	217.
26.000	22.5290	.2144	-.34	223.77	1.81	-.07	35.0700	.2991	.29	202.	202.	202.
27.000	19.3700	.1893	-.34	225.76	2.03	.11	29.8900	.3019	.18	169.	159.	169.
28.000	16.6970	.1716	-.32	227.66	2.10	.06	25.5500	.2726	-.12	167.	167.	167.
29.000	14.3920	.1527	-.24	229.26	2.33	-.16	21.8700	.2352	-.21	140.	140.	140.
30.000	12.4300	.1435	-.21	230.58	2.22	-.18	18.7800	.1950	-.30	138.	138.	138.
32.000	9.2164	.1358	.27	233.16	3.26	.36	13.7800	.1698	-.36	52.	55.	52.
34.000	6.9101	.1236	.32	236.65	4.16	-.10	10.1800	.1491	.12	52.	56.	51.
36.000	5.2106	.1154	.15	241.12	4.44	.02	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	52.
38.000	3.9546	.0948	.02	248.00	5.27	-.36	5.5550	.1066	.09	52.	56.	52.
40.000	3.0263	.0839	.04	253.45	3.61	.00	4.1630	.0955	.43	51.	55.	51.
42.000	2.3267	.0693	-.06	258.61	3.84	-.09	3.1350	.0755	.62	51.	55.	51.
44.000	1.7985	.0581	-.11	263.20	4.43	.42	2.3730	.0615	.12	51.	54.	51.
46.000	1.3950	.0489	-.13	264.97	5.07	-.07	1.8330	.0528	-.05	51.	54.	51.
48.000	1.0857	.0404	-.20	266.38	5.23	.16	1.4210	.0400	.03	49.	50.	49.
50.000	.8440	.0341	-.23	267.00	5.46	-.11	1.1020	.0381	-.19	49.	51.	49.
52.000	.6563	.0280	-.19	265.94	6.01	.06	.8592	.0345	-.27	49.	50.	49.
54.000	.5103	.0232	-.19	264.91	6.67	.41	.6718	.0277	-.47	47.	49.	47.
56.000	.3955	.0193	-.14	261.52	6.71	-.22	.5276	.0208	-.54	47.	50	47.
58.000	.3051	.0164	-.01	257.65	7.30	-.06	.4124	.0157	-.68	45.	47.	45.
60.000	.2323	.0145	.14	253.61	7.59	.27	.3197	.0149	-.30	39.	42.	39.
62.000	.1757	.0104	.90	248.63	7.31	.34	.2469	.0112	.51	30.	32.	30.
64.000	.1306	.0060	.76	239.98	8.16	.05	.1897	.0070	.67	22.	22.	22.
66.000	.0992	.0056	.57	234.40	10.87	.43	.1476	.0063	.31	17.	17.	17.
68.000	.0770	.0055	-.08	243.91	11.62	-.36	.1099	.0061	-.08	8.	8.	8.
70.000	.9999	.0000	99.99	999.99	99.99	99.99	.9999	.0000	99.99	5.	5.	5.

TABLE 11. 8 THERMODYNAMIC STATISTICAL PARAMETERS, AUGUST
STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	MEAN P MB	S.D. P MB	SKEW P	MEAN T DEG K	S.D. T DEG K	SKEW T	MEAN D G/M3	S.D. D G/M3	SKEW D	NOBS P	NOBS T	NOBS D
.000	1010.7000	1.3063	-.08	301.82	1.30	-.83	1153.0000	5.6440	.67	421.	421.	421.
.002	1010.5000	1.3019	-.07	301.81	1.29	-.83	1153.0000	5.6220	.68	424.	424.	424.
1.000	902.2700	1.1845	.03	294.00	.70	.07	1061.0000	3.0560	-.44	425.	425.	425.
2.000	803.3900	.9951	-.01	288.81	.86	.21	963.7000	3.1420	-.53	425.	425.	425.
3.000	713.6800	.9734	-.12	283.81	.88	-.15	872.6000	2.7770	-.27	425.	425.	425.
4.000	632.4700	.9256	-.17	278.20	.85	-.22	789.8000	2.2810	-.36	424.	424.	424.
5.000	559.2100	.8334	-.25	272.59	.79	-.21	713.3000	2.0340	-.51	424.	424.	424.
6.000	493.1500	.8252	-.24	267.06	.87	.19	642.4000	2.0120	-1.02	423.	423.	423.
7.000	433.4800	.8504	-.28	261.16	.93	-.01	577.7000	1.8910	-1.07	421.	421.	421.
8.000	380.0800	.8310	-.29	254.77	.98	-.24	519.4000	1.8060	-1.53	418.	418.	418.
9.000	331.9500	.8502	-.26	247.73	1.11	-.18	466.7000	1.7870	-1.66	411.	411.	411.
10.000	288.8400	.8827	-.31	239.98	1.19	-.03	419.2000	1.8810	-4.23	408.	408.	408.
11.000	250.2800	.8876	-.35	231.91	1.26	-.14	375.9000	1.2500	.40	400.	400.	400.
12.000	215.3400	.9158	-.24	223.45	1.22	.05	335.7000	.9068	.07	386.	386.	386.
13.000	184.6200	.9282	-.21	215.06	1.17	-.03	299.1000	.7970	-.17	376.	376.	376.
14.000	157.1800	.9044	-.15	207.02	1.19	.01	264.5000	1.1260	-.35	369.	369.	369.
15.000	133.0400	.8281	-.11	200.50	1.33	.08	231.2000	1.6980	-.40	362.	362.	362.
16.000	112.2900	.7388	-.30	197.59	1.74	-.27	198.0000	2.1960	-.17	268.	268.	268.
17.000	94.5640	.5799	.01	198.44	2.30	-.40	166.0000	2.2930	.36	265.	265.	265.
18.000	79.8220	.4884	.22	202.77	2.11	.07	137.2000	1.6990	.01	266.	266.	266.
19.000	67.6480	.4097	-.07	206.61	2.06	-.05	114.1000	1.1540	.15	263.	263.	263.
20.000	57.4920	.3832	-.17	209.47	2.11	.04	95.6200	.8996	.21	259.	259.	259.
21.000	48.9650	.3562	-.23	211.96	2.10	.06	80.4800	.7197	-.38	252.	252.	252
22.000	41.7800	.3434	-.26	214.20	2.02	-.29	67.9500	.5421	-.32	251.	251.	251.
23.000	35.7110	.3201	-.29	216.37	1.92	-.35	57.5000	.4115	-.23	243.	243.	243.
24.000	30.5550	.3033	-.28	218.54	2.09	-.55	48.7100	.4093	-.20	243.	243.	243.
25.000	26.2030	.2022	-.24	220.83	1.99	-.08	41.3400	.3770	-.17	239.	239.	239.
26.000	22.4950	.2517	-.26	222.94	1.97	-.14	35.1500	.3563	-.07	228.	228.	228.
27.000	19.3400	.2290	-.24	225.06	2.16	.11	29.9400	.3372	-.04	196.	196.	196.
28.000	16.6660	.2074	-.22	227.00	1.93	.14	25.5800	.2766	-.23	192.	192.	192.
29.000	[illegible]	.1854	-.20	228.73	[illegible]	.10	[illegible]	[illegible]	-.33	156.	156.	156.
30.000	12.3970	.1714	-.13	230.00	2.41	-.02	18.7800	.2182	-.91	154.	154.	154.
32.000	9.1273	.1297	.26	232.46	3.39	-.07	13.6800	.1918	-.43	81.	86.	81.
34.000	6.8479	.1097	.47	236.59	3.48	-.06	10.0800	.1571	-.20	80.	86.	80.
36.000	5.1639	.0935	.50	241.78	3.61	.06	7.4450	.1222	.06	81.	87.	81.
38.000	3.9226	.0816	.40	248.56	4.50	-.12	5.5040	.0893	.14	81.	87.	81.
40.000	3.0008	.0715	.32	255.17	5.03	-.13	4.1030	.0850	-.11	80.	86.	80.
42.000	2.3122	.0613	.30	261.27	4.45	.25	3.0840	.0696	.09	80.	85.	80.
44.000	1.7912	.0519	.39	265.59	4.82	.06	2.3510	.0567	-.33	80.	84.	80.
46.000	1.3924	.0445	.41	268.51	5.39	.10	1.8080	.0442	.31	79.	83.	79.
48.000	1.0852	.0379	.39	270.53	5.17	.21	1.4000	.0407	.37	79.	83.	79.
50.000	.8463	.0316	.36	269.67	5.19	.19	1.0950	.0336	.35	79.	84.	79.
52.000	.6591	.0265	.33	266.94	5.68	.16	.8594	.0287	.23	79.	79.	79.
54.000	.5122	.0222	.32	264.98	5.78	-.59	.6731	.0244	.19	78.	82.	78.
56.000	.3979	.0182	.28	263.42	5.41	-.56	.5260	.0207	.08	77.	82.	77.
58.000	.3077	.0148	.31	261.41	5.73	.02	.4102	.0158	.12	75.	81.	75.
60.000	.2361	.0127	.06	256.60	6.08	.02	.3206	.0121	-.13	65.	68.	65.
62.000	.1784	.0085	.58	250.85	6.99	.17	.2477	.0074	.23	48.	48.	48.
64.000	.1357	.0064	.34	247.43	8.07	.00	.1910	.0055	-.46	41.	41.	41.
66.000	.1042	.0053	.46	246.16	9.72	.05	.1475	.0057	-.77	35.	35.	35.
68.000	.0807	.0045	-.11	248.64	8.95	-.41	.1131	.0044	-.23	21.	21.	21.
70.000	.0628	.0036	-.12	250.52	9.07	-.81	.0872	.0029	.18	14.	14.	14.

TABLE 11. 9 THERMODYNAMIC STATISTICAL PARAMETERS. SEPTEMBER

STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	MEAN P MB	S.D. P MB	SKEW P	MEAN T DEG K	S.D. T DEG K	SKEW T	MEAN D G/M3	S.D. D G/M3	SKEW D	NOBS P	NOBS T	NOBS D
.000	1010.4000	1.3917	.02	301.91	1.46	-.68	1153.0000	6.0930	.62	420.	420.	420.
.002	1010.2000	1.3906	.02	301.89	1.47	-.69	1152.0000	6.0950	.62	423.	423.	423.
1.000	902.0700	1.3104	-.17	294.14	.78	-.12	1060.0000	3.0450	.22	423.	423.	423.
2.000	803.3400	1.1404	-.20	288.86	.92	.04	963.3000	3.1920	-.07	423.	423.	423.
3.000	713.6700	1.1055	-.35	283.84	.94	.10	872.4000	2.7080	-.03	423.	423.	423.
4.000	632.4500	1.1055	-.39	278.25	.94	.09	789.5000	2.4110	-.09	423.	423.	423.
5.000	559.2400	1.0078	-.18	272.69	.90	.09	712.9000	2.1420	-.44	423.	423.	423.
6.000	493.2100	1.0113	-.25	267.20	.88	.04	642.1000	2.0400	-.51	424.	424.	424.
7.000	433.5700	1.0090	-.17	261.36	.92	.20	577.4000	1.9390	-.86	424.	424.	424.
8.000	380.2100	.9499	-.12	255.08	1.04	.35	519.0000	1.8380	-1.05	423.	423.	423.
9.000	332.1300	.9501	.00	248.10	1.15	.25	466.2000	1.7830	-1.37	419.	419.	419.
10.000	289.0900	.9935	-.02	240.46	1.22	.34	418.7000	1.5610	-1.95	407.	407.	407.
11.000	250.5300	.9954	.04	232.79	1.29	.46	375.6000	1.4840	-2.38	402.	402.	402.
12.000	215.6600	.9816	.14	223.93	1.24	.52	335.5000	.9913	-.27	397.	397.	397.
13.000	184.9900	.9862	.21	215.50	1.23	.49	299.0000	.9735	-.36	383.	383.	383.
14.000	157.5700	.9334	.44	207.44	1.34	.62	264.6000	1.2560	-1.03	370.	370.	370.
15.000	133.4300	.8722	.48	200.69	1.40	.48	231.6000	1.6620	-.74	358.	358.	358.
16.000	112.5200	.7958	.40	197.09	1.68	-.33	198.9000	2.1500	.25	254.	254.	254.
17.000	94.7040	.6648	.52	197.21	2.37	-.53	167.3000	2.4620	.65	250.	250.	250.
18.000	79.8590	.5614	.57	201.41	2.53	.12	138.1000	1.6750	.50	248.	248.	248.
19.000	67.6180	.4947	.66	205.57	2.26	.06	114.6000	1.2370	.00	244.	244.	244.
20.000	57.4240	.4612	.57	208.75	2.22	.13	95.8400	.9029	.29	241.	241.	241.
21.000	48.8880	.4442	.53	211.33	2.04	.37	80.5900	.7034	.23	233.	233.	233.
22.000	41.6910	.4197	.55	213.41	1.87	.29	68.0600	.5510	.20	233.	233.	233.
23.000	35.6200	.3762	.59	215.95	1.74	.17	57.4600	.4673	.33	229.	229.	229.
24.000	30.4670	.3487	.63	218.57	2.09	.19	48.5600	.4038	.30	230.	230.	230.
25.000	26.1290	.3235	.65	220.78	2.00	-.14	41.2300	.4423	.21	223.	223.	223.
26.000	22.4320	.2932	.64	222.91	1.94	-.28	35.0600	.4210	.33	215.	215.	215.
27.000	19.2920	.2600	.62	225.06	2.18	.04	29.8600	.4116	.44	200.	200.	200.
29.000	16.6100	.2247	.46	227.30	1.82	-.08	25.4700	.3430	.37	196.	196.	196.
29.000	14.3230	.1942	.43	229.21	2.08	.00	21.7700	.2969	.35	158.	158.	158.
30.000	12.3730	.1758	.35	230.92	1.94	-.29	18.6700	.2535	.24	159.	159.	159.
32.000	9.1411	.1542	-.08	235.73	3.83	.20	13.5300	.2680	-.80	80.	84	80.
34.000	6.8800	.1258	.09	239.96	3.68	-.37	10.0000	.1863	-.46	80.	84.	80.
36.000	5.2052	.1098	.04	245.80	4.03	-.18	7.3820	.1488	-.27	80.	84.	80.
38.000	3.9719	.0879	.19	252.22	3.93	.26	5.4930	.1139	-.11	80.	84.	80.
40.000	3.0501	.0733	.29	258.70	4.57	.19	4.1120	.0929	.03	80.	84.	80.
42.000	2.3612	.0613	.11	264.59	4.35	.27	3.1120	.0808	.18	79.	82.	79.
44.000	1.8351	.0496	.09	268.82	4.19	-.17	2.3800	.0651	.08	79.	82.	79.
46.000	1.4302	.0399	.08	270.05	4.03	.10	1.8450	.0515	.23	79.	75.	79.
48.000	1.1153	.0328	.05	269.82	4.89	.08	1.4400	.0384	-.20	79.	76.	79.
50.000	.8699	.0270	.05	270.07	4.76	.20	1.1220	.0330	.10	79.	76.	79.
52.000	.6784	.0223	.04	269.41	4.93	.30	.8778	.0251	.07	79.	79.	79.
54.000	.5288	.0186	-.01	269.92	4.56	-.08	.6853	.0199	.35	79.	80.	79.
56.000	.4120	.0157	-.15	266.27	5.47	-.04	.5389	.0166	.32	75.	76.	75.
58.000	.3197	.0134	-.18	262.60	6.06	-.11	.4240	.0138	-.11	75.	77.	75.
60.000	.2464	.0115	-.06	258.61	6.69	-.24	.3322	.0116	.14	63.	66.	63.
62.000	.1878	.0102	.30	252.24	9.09	-.14	.2594	.0103	1.28	47.	48.	47.
64.000	.1415	.0078	.34	245.40	10.08	.19	.2009	.0081	.73	37.	37	37.
66.000	.1077	.0067	.04	242.87	11.17	-.14	.1545	.0062	-.16	28.	28.	28.
68.000	.0819	.0057	-.51	245.33	10.05	-.37	.1164	.0061	-.92	18.	18.	18.
70.000	.0632	.0039	-.40	247.23	8.54	.40	.0909	.0034	-.29	15.	15.	15.

TABLE 11. 10 THERMODYNAMIC STATISTICAL PARAMETERS, OCTOBER

STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	MEAN P MB	S.D. P MB	SKEW P	MEAN T DEG K	S.D. T DEG K	SKEW T	MEAN D G/M3	S.D. D G/M3	SKEW D	NOBS P	NOBS T	NOBS D
.000	1010.3000	1.5358	-.50	301.84	1.38	-1.01	1153.0000	5.8800	1.04	438.	438.	438.
.002	1010.1000	1.5318	-.51	301.82	1.39	-1.01	1153.0000	5.8920	1.06	442.	442.	442.
1.000	902.0000	1.4095	-.27	294.04	.77	.21	1060.0000	3.4300	-.21	442.	442.	442.
2.000	803.2200	1.1934	-.45	288.86	.93	.15	963.2000	3.4330	-.26	442.	442.	442.
3.000	713.5900	1.1581	-.32	283.90	.97	-.11	872.1000	2.8970	-.13	442.	442.	442.
4.000	632.4000	1.1103	-.12	278.31	.96	-.08	789.3000	2.5750	-.52	442.	442.	442.
5.000	559.2000	1.0122	-.13	272.74	.93	-.17	712.7000	2.4600	-.72	442.	442.	442.
6.000	493.1900	.9712	-.09	267.27	1.00	-.08	641.9000	2.4130	-.90	440.	440.	440.
7.000	433.6000	.9488	-.11	261.40	.97	-.58	577.7000	2.1330	-.74	439.	439.	439.
8.000	380.2100	.8839	-.23	255.13	1.05	-.45	510.0000	1.9900	-1.45	437	437.	437
9.000	332.1400	.8135	-.39	248.21	1.19	-.45	466.0000	2.0470	-1.73	435.	435.	435.
10.000	289.1300	.9414	-.54	240.51	1.33	-.29	418.6000	1.9060	-2.02	426.	426.	426.
11.000	250.6000	.9449	-.71	232.40	1.39	-.18	375.6000	1.4620	-.33	418.	418.	418.
12.000	215.6900	.9523	-.85	224.00	1.38	-.41	335.4000	1.1500	-.12	411.	411.	411.
13.000	185.0300	.9684	-.87	215.68	1.34	-.49	298.9000	1.0220	-.21	394.	394.	394.
14.000	157.6100	.9450	.90	207.75	1.38	-.32	264.3000	1.3650	-.57	380.	380.	380.
15.000	133.5000	.8907	-.14	200.90	1.41	.07	231.5000	1.5580	-.42	374.	374.	374.
16.000	112.5500	.7140	.41	196.40	1.64	.23	199.6000	1.8900	-.31	263.	263.	263.
17.000	94.6830	.6120	-.03	195.41	2.06	-.07	168.8000	2.0420	.22	262.	262.	262.
18.000	79.6630	.5403	.05	198.94	2.76	-.14	139.5000	2.0500	.43	263.	263.	263.
19.000	67.3380	.4842	.09	203.80	2.46	-.20	115.1000	1.3920	.52	263.	263.	263.
20.000	57.1270	.4540	.22	207.62	2.37	.00	95.8600	.9847	.30	259.	259.	259.
21.000	48.6220	.4281	.33	210.66	2.32	-.01	80.4100	.7411	-.33	243.	243.	243.
22.000	41.4460	.4107	.36	213.17	2.21	-.09	67.7400	.6208	-.47	243.	243.	243.
23.000	35.4100	.3780	.32	215.73	2.05	-.43	57.1800	.5290	.08	237.	237.	237.
24.000	30.2750	.3546	.28	218.37	2.16	-.32	48.3000	.5359	.09	241.	241.	241.
25.000	25.9650	.3191	.27	220.98	1.92	-.49	40.9300	.4940	.15	241.	241.	241.
26.000	22.3040	.2810	.28	223.56	1.76	-.06	34.7600	.4610	-.01	236.	236.	236.
27.000	19.1000	.2309	.43	225.97	2.05	.29	29.6000	.4190	.21	211.	211.	211.
28.000	16.5480	.2024	.40	228.02	1.96	.10	25.2800	.3703	.22	209.	209.	209.
29.000	14.2710	.1697	.41	229.94	2.20	-.25	21.6300	.3341	.40	182.	182.	182.
30.000	12.3380	.1475	.35	231.81	2.20	-.19	18.5400	.2820	.42	179.	179.	179.
32.000	9.1905	.1467	.35	237.18	3.17	-.09	13.5100	.1920	.02	59.	62.	58.
34.000	6.9401	.1206	.62	242.13	3.72	-.09	9.9910	.1339	-.07	59.	62.	59.
36.000	5.2670	.1096	.37	248.29	4.18	.26	7.3980	.1458	-.08	59.	62.	59.
38.000	4.0320	.0883	.65	255.19	4.25	.02	5.5080	.1027	.36	59.	62.	59.
40.000	3.1012	.0757	.61	259.93	4.03	-.48	4.1540	.0903	.45	59.	62.	59.
42.000	2.4028	.0613	.58	264.86	3.98	.10	3.1590	.0757	.46	59.	61.	59.
44.000	1.8668	.0506	.55	267.14	4.28	-.39	2.4330	.0562	.14	59.	59.	59.
46.000	1.4523	.0427	.58	268.77	4.66	.27	1.8820	.0441	-.05	59.	59.	59.
48.000	1.1326	.0364	.56	271.00	4.97	-.10	1.4550	.0367	.36	59.	56.	59.
50.000	.8849	.0309	.47	272.34	4.83	-.32	1.1320	.0293	.68	59.	56.	59.
52.000	.6914	.0250	.36	270.94	4.69	-.16	.8890	.0280	.54	59.	58.	59.
54.000	.5393	.0214	.27	267.58	4.50	-.59	.7004	.0232	.38	59.	55.	59
56.000	.4191	.0177	.20	264.36	4.23	-.39	.5522	.0197	.42	58.	60.	58.
58.000	.3243	.0152	.16	260.40	5.09	-.29	.4335	.0161	.29	56.	58.	56.
60.000	.2504	.0126	.24	256.74	6.14	-.30	.3395	.0123	.47	48.	50.	48.
62.000	.1904	.0099	.38	252.78	6.42	-.14	.2621	.0098	.74	37.	39.	37.
64.000	.1455	.0081	.54	249.42	8.39	-.47	.2030	.0069	.47	33.	35.	33.
66.000	.1119	.0049	.71	248.12	8.92	-.40	.1570	.0041	.40	25.	26.	25.
68.000	.0871	.0032	.30	249.72	6.05	.07	.1212	.0040	.23	15.	16.	15.
70.000	.0662	.0026	.44	248.43	7.20	.24	.0924	.0025	-.20	10.	11.	10.

TABLE II. 11 THERMODYNAMIC STATISTICAL PARAMETERS. NOVEMBER

STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	MEAN P MB	S.D. P MB	SKEW P	MEAN T DEG K	S.D. T DEG K	SKEW T	MEAN D G/M3	S.D. D G/M3	SKEW D	NOBS P	NOBS T	NOBS D
.000	1010.0000	1.5943	-.14	301.76	1.46	-.88	1153.0000	6.1990	.83	411.	411.	411.
.002	1009.7000	1.6083	-.14	301.75	1.47	-.89	1153.0000	6.1840	.83	415.	415.	415.
1.000	901.6400	1.4700	-.16	293.92	.83	-.33	1061.0000	3.6580	.11	416.	416.	416.
2.000	802.8300	1.3256	-.08	288.97	1.03	.02	962.6000	3.6000	-.10	416.	416.	416.
3.000	713.2800	1.2766	-.07	284.12	1.10	-.16	871.3000	3.1400	-.09	416.	416.	416.
4.000	632.2400	1.2462	-.06	278.61	1.16	-.11	788.4000	3.0090	-.30	416.	416.	416.
5.000	559.0600	1.2191	-.15	273.08	1.13	.08	711.8000	2.8170	-.69	416.	416.	416.
6.000	493.1100	1.1866	-.21	267.45	1.16	-.40	641.4300	2.6070	-.62	416.	416.	416.
7.000	433.5600	1.1716	-.19	261.46	1.17	-.45	577.1000	2.3520	-1.02	415.	415.	415.
8.000	380.1500	1.1780	-.32	255.10	1.20	-.36	518.7000	2.1530	-1.59	415.	415.	415.
9.000	332.0900	1.1885	-.31	248.18	1.33	-.57	465.9000	2.1530	-1.84	410.	410.	410.
10.000	289.0500	1.2117	-.41	240.54	1.41	-.71	418.4000	2.0020	-2.84	399.	399.	399.
11.000	250.3400	1.2017	-.33	232.51	1.45	-.79	375.3000	1.5130	-.67	394.	394.	394.
12.000	215.6800	1.2110	-.53	224.25	1.48	-.99	335.1000	1.1920	.18	386.	386.	386.
13.000	185.0300	1.2260	-.59	216.04	1.53	-1.16	298.4000	1.1970	-.40	370.	370.	370.
14.000	157.6400	1.1926	-.70	208.09	1.54	-1.25	263.9000	1.3740	-.48	363.	363.	363.
15.000	133.5300	1.1279	-.90	200.99	1.50	-.92	231.4000	1.6 70	-.41	356.	356.	356.
16.000	112.6100	.8591	-.39	195.48	1.38	.01	200.7000	1.7540	.25	264.	264.	264.
17.000	94.5870	.7486	-.45	192.63	1.66	-.01	171.1000	1.9530	.05	262.	262.	262.
18.000	79.3280	.6532	-.49	194.84	2.52	.09	141.9000	2.1700	.09	262.	262.	262.
19.000	66.8700	.5382	-.37	201.59	2.54	-.26	115.6000	1.7960	-.01	260.	260.	260.
20.000	56.6600	.4500	-.15	206.49	2.35	-.33	95.6000	1.3270	-.15	258.	258.	258.
21.000	48.1750	.3960	.03	209.91	2.22	-.34	79.9500	.9750	-.29	246.	246.	246.
22.000	41.0410	.3562	.22	212.61	2.13	-.19	67.2500	.7931	-.17	243.	243.	243.
23.000	35.0600	.3145	.33	215.46	[illegible]	.06	56.6900	.5673	-.05	237.	237.	237.
24.000	29.9720	.2753	.47	218.24	[illegible]	.17	47.8500	.5688	.08	242.	242.	242.
25.000	25.7040	.2460	.37	221.22	2.10	.23	40.4800	.5272	.04	234.	234.	234.
26.000	22.0890	.2143	.31	223.83	1.86	.33	34.3800	.4274	.23	226.	226.	226.
27.000	19.0110	.1817	.07	226.31	2.16	.17	29.2700	.3826	.33	208.	208.	208.
28.000	16.3900	.1608	-.05	228.62	2.22	-.27	24.9800	.3138	.47	207.	207.	207.
29.000	14.1360	.1379	-.23	230.79	2.46	-.53	21.3400	.2537	.49	163.	163.	163.
30.000	12.2250	.1265	-.25	232.51	2.14	-.43	18.3200	.1882	.08	161.	161.	161.
32.000	9.0990	.1688	-.12	236.33	3.48	-.20	13.4200	.2056	-.60	46.	47.	46.
34.000	6.8567	.1468	-.12	240.67	4.12	-.66	9.9310	.1528	-.22	46.	47.	46.
36.000	5.1975	.1270	-.20	246.61	4.07	-.32	[illegible]	.1502	.30	[illegible]	[illegible]	[illegible]
38.000	3.9684	.1070	-.30	252.50	4.02	-.60	5.4780	.1064	.28	46.	47.	46.
40.000	3.0458	.0906	-.39	256.39	3.87	-.07	4.1410	.0955	.06	46.	47.	46.
42.000	2.3491	.0751	-.42	262.06	3.64	-.18	3.1250	.0801	-.37	46.	48.	46.
44.000	1.8201	.0626	-.42	265.07	4.17	-.18	2.3920	.0679	-.40	46.	47.	46.
46.000	1.4151	.0528	-.39	268.96	4.92	.00	1.8330	.0547	-.15	45.	44.	45.
48.000	1.1036	.0447	-.42	270.35	5.40	-.09	1.4210	.0414	-.14	45.	41.	45.
50.000	.8603	.0382	-.44	269.14	5.19	-.30	1.1140	.0384	-.23	44.	45.	44.
52.000	.6699	.0322	-.46	266.69	5.22	-.38	.8734	.0318	-.47	44.	43.	44.
54.000	.5205	.0269	-.48	263.85	6.21	-.76	.6872	.0263	-.24	44.	46.	44.
56.000	.4025	.0224	-.48	260.63	5.59	-.40	.5380	.0222	-.44	43.	45.	43.
58.000	.3035	.0195	-.35	257.01	5.84	-.27	.4196	[illegible]	-.62	37.	39.	37.
60.000	.2394	.0151	-.26	253.91	7.11	.13	.3284	[illegible]	-.78	34.	36.	34.
62.000	.1812	.0121	[illegible]	249.51	7.60	.33	.2532	.0126	-.65	29.	31.	29.
64.000	.1367	.0095	.27	244.93	6.69	.23	.1946	.0106	-.24	25.	26.	25.
66.000	.1043	.0063	-.23	244.10	6.75	-.34	.1490	.0075	-.53	16.	17.	15.
68.000	.082	.0040	-.30	247.76	6.13	-.31	.1155	.0038	.42	9.	10.	9.
70.000	.0631	.0036	-.64	250.49	9.99	-.56	.0878	.0035	.12	8.	9.	8.

TABLE II. 12 THERMODYNAMIC STATISTICAL PARAMETERS, DECEMBER
STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	MEAN P MB	S.D. P MB	SKEW P	MEAN T DEG K	S.D. T DEG K	SKEW T	MEAN D G/M3	S.D. D G/M3	SKEW D	NOBS P	NOBS T	NOBS D
.000	1009.7000	1.7158	-.01	301.55	1.12	-1.14	1154.0000	4.9670	.81	410.	410.	410.
.002	1009.5000	1.7376	.01	301.55	1.11	-1.14	1154.0000	4.9980	.79	422.	422.	422.
1.000	901.2700	1.5958	-.06	293.43	.99	.03	1062.0000	4.2760	-.10	422.	422.	422.
2.000	802.4000	1.5130	-.21	289.07	1.31	-.0[illegible]	962.3000	4.1540	.02	423.	423.	423.
3.000	712.9000	1.4786	-.09	284.61	1.24	-.50	869.8000	3.4110	.12	423.	423.	423.
4.000	631.9800	1.4879	-.58	279.27	1.19	-.23	786.5000	3.1470	-.39	423.	423.	423.
5.000	558.9000	1.3506	-.12	273.65	1.17	-.12	710.3000	2.8950	-.55	422.	422.	422.
6.000	493.1400	1.3259	-.25	267.95	1.18	-.21	640.2000	2.7710	-.31	421.	421.	421.
7.000	433.6700	1.2817	-.17	261.91	1.16	-.11	576.1000	2.5840	-.55	420.	420.	420.
8.000	380.3100	1.2506	-.25	255.54	1.16	-.06	517.9000	2.2500	-.59	410.	410.	410.
9.000	332.2900	1.2465	-.14	248.63	1.22	-.12	465.2000	2.2020	-.85	397.	397.	397.
10.000	289.3100	1.2209	-.19	241.06	1.28	.20	417.[illegible]000	2.0540	-1.54	389.	389.	389.
11.000	250.8200	1.1713	-.16	233.09	1.28	.35	374.8000	1.6130	-1.09	385.	385.	385.
12.000	216.0100	1.1549	-.07	224.85	1.26	.40	334.7000	1.1950	-.36	378.	378.	378.
13.000	185.3800	1.1324	.00	216.60	1.26	.27	298.2000	1.1740	-.34	365.	365.	365.
14.000	157.9900	1.0818	.09	208.44	1.36	.06	264.1000	1.3500	-.26	359.	359.	359.
15.000	133.8200	1.0138	.11	200.95	1.32	.04	232.0000	1.3980	-.19	356.	356.	356.
16.000	112.7900	.8506	-.09	194.63	1.34	.00	201.9000	1.6650	-.09	270.	270.	270.
17.000	94.6590	.7355	-.06	190.82	1.80	-.53	172.8000	2.1210	.13	265.	265.	265.
18.000	79.2280	.6217	.08	192.64	2.71	-.12	143.3000	2.4190	.29	264.	264.	264.
19.000	66.6730	.4896	.11	199.78	2.64	-.26	116.3000	1.8890	.25	263.	263.	263.
20.000	56.4210	.3987	.27	205.48	2.46	-.44	95.6700	1.3897	.38	260.	260.	260.
21.000	47.9420	.3444	.37	209.51	2.12	-.42	79.7200	.9168	.29	252.	252.	252.
22.000	40.8360	.3095	.44	212.74	2.12	-.39	66.8800	.7552	.16	250.	250.	250.
23.000	34.8820	.2722	.45	215.61	1.79	-.36	56.3600	.5603	.26	243.	243.	243.
24.000	29.8290	.2405	.39	218.34	2.24	.08	47.6000	.5686	.26	240.	240.	240.
25.000	25.5800	.2210	.27	220.72	2.14	.21	40.3800	.4670	.26	240.	240.	240.
26.000	21.9670	.1975	.20	222.91	1.94	.28	34.3300	.3486	.00	228.	228.	228.
27.000	18.8900	.1802	.20	225.02	2.12	.61	29.2500	.3106	-.29	206.	206.	206.
28.000	16.2660	.1663	.20	226.55	2.03	.24	25.0100	.2402	-.14	205.	205.	205.
29.000	[illegible]	.1490	[illegible]	228.29	2.00	-.03	21.[illegible]	[illegible]	[illegible]	178.	178	178.
30.000	12.1050	.1382	.16	230.18	1.96	.04	18.3200	.1849	.07	177.	177.	177.
32.000	9.0078	.1486	.40	234.67	3.23	.20	13.3800	.1868	-.03	67.	69.	67.
34.000	6.7754	.1273	.44	239.74	3.57	.03	9.8500	.1516	.20	67.	69.	67.
36.000	5.1241	.1108	.54	244.74	3.81	.19	7.2970	.1466	-.11	67.	69.	67.
38.000	3.9051	.0890	.54	249.48	3.75	.00	5.4540	.1259	.08	67.	69.	67.
40.000	2.9892	.0739	.48	254.06	4.53	-.28	4.1000	.0873	.14	67.	69.	67.
42.000	2.3018	.0633	.30	260.74	5.10	-.06	3.0750	.0677	.53	67.	69.	67.
44.000	1.7824	.0548	.20	265.04	4.74	.10	2.3430	.0576	.19	67.	69.	67.
46.000	1.3844	.0464	.20	267.24	4.45	-.11	1.8040	.0447	.13	67.	66.	67.
48 000	1.0775	.0399	.10	269.29	4.27	.07	1.3920	.0417	.42	67.	61.	67.
50.000	.8407	.0325	.06	265.46	4.42	-.10	1.0860	.0336	.14	67.	63.	67.
52.000	.6552	.0271	.08	267.73	4.74	.16	.8510	.0281	-.37	67.	63.	67.
54.000	.5099	.0227	.13	265.94	4.73	-.12	.6670	.0241	-.23	66.	65.	66.
56.000	.3984	.0191	.16	264.53	4.86	-.21	.5218	.0204	-.08	64.	65.	64.
58.000	.3078	.0158	.18	262.18	5.35	-.21	.4089	.0163	.03	61.	63.	61.
60.000	.2383	.0132	.11	257.02	6.71	-.38	.3202	.0132	.03	57.	57.	57.
62.000	.1822	.0109	.02	255.59	8.02	.26	.2482	.0104	-.40	44.	44.	44.
64.000	.1395	.0086	-.15	252.55	7.84	-.12	.1923	.0088	.16	37.	33.	33.
66.000	.1063	.0068	-.81	249.95	9 07	-.10	.1480	.0053	-1.06	19.	19.	19.
68.000	.0941	.0049	-.69	252.94	13.69	-1.00	.1158	.0024	-.20	9.	9.	9.
70.000	.0563	.0020	-.43	262.99	5.49	-.80	.0878	.0012	.33	6.	6.	6.

TABLE II. 13 THERMODYNAMIC STATISTICAL PARAMETERS, ANNUAL

STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	MEAN P MB	S.D. P MB	SKEW P	MEAN T DEG K	S.D. T DEG K	SKEW T	MEAN D G/M3	S.D. D G/M3	SKEW D	NOBS P	NOBS T	NOBS D
.000	1010.4000	1.5825	-.19	301.73	1.29	-.98	1154.0000	5.5430	.83	4944.	4944.	4944.
.002	1010.2000	1.5866	-.20	301.71	1.29	-.98	1154.0000	5.5680	.83	5033.	5033.	5033.
1.000	901.9800	1.4596	-.25	293.63	.95	-.33	1062.0000	4.0630	.26	5038.	5038.	5038.
2.000	803.0600	1.3312	-.42	288.88	1.13	-.02	953.4000	3.7760	.03	5039.	5039.	5039.
3.000	713.4300	1.2713	-.45	284.18	1.16	.12	871.5000	3.3710	-.29	5038.	5038.	5038.
4.000	632.3600	1.2181	-.45	279.69	1.20	.32	788.4000	3.2370	-.63	5036.	5036	5036.
5.000	559.1900	1.1311	-.33	273.13	1.18	.38	711.9000	2.9780	-.78	5035.	5035.	5035.
6.000	493.2500	1.1051	-.27	267.56	1.17	.19	641.3000	2.6990	-.70	5024.	5024.	5024.
7.000	433.6800	1.0974	-.14	261.61	1.16	.08	576.9000	2.4400	-.75	4998.	4998.	4998.
8.000	380.3100	1.0831	-.18	255.27	1.20	-.03	[illegible]	2.2290	-.92	[illegible]	[illegible]	[illegible]
9.000	332.2400	1.0862	-.11	248.33	1.31	-.08	465.8000	2.1880	-1.26	4822.	4822.	4822.
10.000	289.2300	1.1163	-.09	240.67	1.38	-.03	418.4000	1.9770	-1.89	4683.	4683.	4683.
11.000	250.7100	1.0999	-.10	232.63	1.42	-.06	375.4000	1.6150	-1.07	4627.	4627.	4627.
12.000	215.8300	1.1215	-.03	224.29	1.44	-.06	335.2000	1.1540	-.09	4527.	4527.	4527.
13.000	185.1700	1.1265	-.01	216.00	1.48	-.07	298.6000	1.1090	-.25	4406.	4406.	4406.
14.000	157.7500	1.0987	.05	207.98	1.49	-.11	264.2000	1.2530	-.11	4316.	4316.	4316.
15.000	133.6200	1.0316	.03	200.91	1.42	-.08	231.7000	1.5640	-.42	4246.	4246.	4246.
16.000	112.6600	.8964	.15	195.88	1.82	.19	200.4000	2.3200	-.26	3198.	3198.	3198.
17.000	94.6920	.7503	.12	193.96	3.35	.28	170.1000	3.3090	-.09	3157.	3157.	3157.
18.000	79.5350	.6715	-.01	196.76	4.67	.00	140.9000	3.3100	.32	3151.	3151.	3151.
19.000	67.1190	.6316	-.04	202.40	3.60	-.14	115.6000	1.8840	.54	3122.	3122.	3122.
20.000	56.8930	.6020	.07	206.98	2.82	-.22	95.7700	1.1830	.38	3079.	3079.	3079.
21.000	48.3930	.5612	.13	210.49	2.41	-.22	80.1000	.9012	-.02	2943.	2943.	2943.
22.000	41.2490	.5204	.17	213.32	2.22	-.17	67.3700	.8143	-.26	2933.	2933.	2933.
23.000	35.2430	.4629	.20	215.95	1.95	-.09	56.6600	.6824	-.14	2837.	2837.	2837.
24.000	30.1440	.4144	.26	218.50	2.25	-.01	48.0600	.6577	-.15	2850.	2850.	2850.
25.000	25.8500	.3718	.23	220.88	2.27	-.20	40.7700	.5699	-.07	2806.	2806.	2806.
26.000	22.1960	.3276	.20	223.16	2.16	-.29	34.6500	.4812	.16	2688.	2688.	2688.
27.000	19.0900	.2882	.16	225.36	2.32	-.14	29.5100	.4284	.26	2385.	2385.	2385.
28.000	16.4460	.2601	.08	227.33	2.31	-.25	25.2000	.3665	.26	2358.	2358.	2358.
29.000	[illegible]	.2291	.00	229.21	2.49	-.29	21.5500	.3242	.27	2026.	2026.	2026.
30.000	12.2430	.2076	-.05	231.01	2.39	-.26	18.4700	.2874	.25	2002.	2002.	2002.
32.000	9.0915	.1749	-.18	234.95	3.78	.15	13.4900	.2520	-.14	765.	795.	758.
34.000	6.8407	.1440	-.03	239.42	4.06	-.10	9.9600	.1970	-.08	762.	798.	758.
36.000	5.1749	.1229	.04	244.91	4.60	.09	7.3650	.1632	.01	760.	797.	759.
38.000	3.9463	.1018	.00	251.32	5.01	-.09	5.4730	.1243	-.12	760.	798.	760.
40.000	3.0274	.0865	.00	257.08	5.04	.00	4.1040	.1001	-.01	757.	795.	757
42.000	2.3374	.0736	-.05	262.24	4.94	.02	3.1050	.0807	.10	755.	788.	755.
44.000	1.8124	.0619	-.08	266.28	4.89	.04	2.3710	.0676	-.08	755.	774.	755.
46.000	1.4102	.0517	-.07	268.80	4.99	.04	1.8260	.0576	-.21	751.	741.	751.
48.000	1.0996	.0428	-.05	270.42	5.22	.08	1.4160	.0492	-.23	748.	732.	748.
50.000	.8581	.0351	-.04	270.37	5.21	-.04	1.1060	.0413	-.19	745.	740.	745.
52.000	.6692	.0287	-.02	268.80	5.43	-.09	.8670	.0336	-.24	745.	740.	745.
54.000	.5212	.0236	.01	266.75	5.57	-.28	.6801	.0276	-.25	736.	739.	736.
56.000	.4048	.0193	.02	264.03	5.53	-.36	.5339	.0221	-.20	711.	736.	711.
58.000	.3133	.0159	.09	260.81	6.22	-.22	.4184	.0177	-.16	675.	708.	675.
60.000	.2409	.0134	.16	256.90	7.08	-.11	.3266	.0144	-.08	567.	593.	567.
62.000	.1831	.0103	.33	252.26	8.34	.09	.2529	.0111	.14	431.	449.	431.
64.000	.1391	.0081	.30	247.58	9.58	.06	.1958	.0085	.12	355.	365.	355.
66.000	.1051	.0064	.03	244.94	10.72	-.37	.1509	.0066	-.31	259.	266.	259.
68.000	.0818	.0054	-.24	246.50	11.50	-.73	.1156	.0052	-.37	162.	167.	162.
70.000	.0636	.0036	-.34	249.60	9.80	-.58	.0886	.0031	-.01	99.	104.	99.

TABLE III.1 MOISTURE RELATED STATISTICAL PARAMETERS, JANUARY
STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	VAPOR P MEAN MB	S.D. VP MB	SKEW VP	TV MEAN DEG K	TV S.D. DEG K	SKEW TV	DEWPT T MEAN DEG K	S.D. DPT DEG K	SKEW DPT	NOBS T+P	NOBS TV
.000	28.142	2.143	-.20	304.60	1.10	-1.18	295.14	1.27	-.38	413.	413.
.002	28.102	2.143	-.21	304.55	1.12	-1.10	296.12	1.28	-.40	428.	429.
1.000	16.090	2.929	-.02	294.75	1.06	-.01	287.02	2.92	-.60	427.	429.
2.000	9.010	3.652	-.11	289.95	1.52	-.34	277.27	7.11	-1.12	414.	429.
3.000	4.655	2.753	.63	285.58	1.32	-.21	267.25	8.38	-.15	379.	429.
4.000	2.666	1.779	1.08	280.04	1.38	.20	259.96	8.06	.20	361.	428.
5.000	1.526	1.072	1.59	274.29	1.45	.23	253.42	7.20	.54	348.	428.
6.000	.896	.657	1.90	268.49	1.43	.41	247.43	6.73	.79	344.	425.
7.000	.514	.365	2.45	262.41	1.44	.30	241.79	5.81	.87	339.	423.
8.000	.278	.190	3.13	256.06	1.41	.11	235.87	4.97	.85	328.	406
9.000	.149	.091	3.47	249.11	1.57	.52	230.23	4.11	1.16	322.	397.
10.000	.072	.040	3.75	241.43	1.59	.46	223.91	3.62	.64	265.	386.
11.000	.035	.018	3.94	233.33	1.65	.63	217.95	2.93	1.42	262.	379.
12.000	.014	.005	2.77	224.93	1.35	-.27	210.95	2.38	.69	199.	372.
13.000	.005	.002	2.28	216.74	1.35	.00	204.17	2.59	.17	116.	367.
14.000	.002	.001	-.13	208.61	1.33	-.11	195.07	2.61	-.63	22.	364.
15.000	99.999	99.999	999.99	201.01	1.32	-.15	999.99	99.99	999.99	3.	353.
16.000	99.999	99.999	999.99	194.38	1.41	-.23	999.99	99.99	999.99	0.	278.
17.000	99.999	99.999	999.99	197.53	1.80	.36	999.99	99.99	999.99	0.	274.
18.000	99.999	99.999	999.99	192.16	3.35	.12	999.99	99.99	999.99	0.	274.
19.000	99.999	99.999	999.99	199.15	2.78	-.14	999.99	99.99	999.99	0.	270.
20.000	99.999	99.999	999.99	204.65	2.30	-.07	999.99	99.99	999.99	0.	267.
21.000	99.999	99.999	999.99	208.65	2.08	-.09	999.99	99.99	999.99	0.	253.
22.000	99.999	99.999	999.99	211.81	2.07	-.05	999.99	99.99	999.99	0.	253.
23.000	99.999	99.999	999.99	214.53	1.96	.44	999.99	99.99	999.99	0.	243.
24.000	99.999	99.999	999.99	217.03	2.39	.45	999.99	99.99	999.99	0.	248.
25.000	99.999	99.999	999.99	218.98	2.57	.17	999.99	99.99	999.99	0.	245.
26.000	99.999	99.999	999.99	221.16	2.29	.05	999.99	99.99	999.99	0.	239.
27.000	99.999	99.999	999.99	223.33	2.26	.24	999.99	99.99	999.99	0.	211.
28.000	99.999	99.999	999.99	225.13	2.23	.18	999.99	99.99	999.99	0.	210.
29.000	99.999	99.999	999.99	226.93	2.28	.13	999.99	99.99	999.99	0.	187.
30.000	99.999	99.999	999.99	228.90	2.15	.03	999.99	99.99	999.99	0.	186.

TABLE III. 2 MOISTURE RELATED STATISTICAL PARAMETERS, **FEBRUARY**

STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	VAPOR P MEAN MB	S.D. VP MB	SKEW VP	TV MEAN DEG K	TV S.D. DEG K	SKEW TV	DEWPT T MEAN DEG K	S.D. DPT DEG K	SKEW DPT	NOBS T+P	NOBS TV
.000	28.078	2.176	-.59	304.89	1.14	-.97	296.10	1.32	-.96	377.	377.
.002	28.016	2.162	-.53	304.86	1.14	-.95	296.06	1.31	-.90	392.	392.
1.000	15.662	2.713	-.09	294.67	1.01	-.25	286.83	2.73	-.52	391.	392.
2.000	8.851	3.619	-.16	290.05	1.39	-.05	276.98	7.20	-1.04	377.	392.
3.000	4.603	2.516	.55	285.52	1.29	-.06	267.37	7.96	-.36	344.	392.
4.000	2.605	1.603	1.00	280.03	1.34	.39	259.98	7.55	.09	330.	392.
5.000	1.558	.985	1.31	274.36	1.41	.47	253.88	6.98	.26	323.	392.
6.000	.678	.579	2.00	268.56	1.32	.19	247.33	6.20	.55	317.	[illegible]
7.000	.458	.265	2.02	262.54	1.33	.17	241.30	4.93	.64	312.	388.
8.000	.255	.116	2.03	256.15	1.41	.36	235.54	3.91	.44	306.	380.
9.000	.143	.062	2.18	249.23	1.52	.67	230.19	3.37	.82	302.	367.
10.000	.074	.034	2.48	241.53	1.60	.90	224.31	3.24	.97	256.	352.
11.000	.034	.015	3.20	233.35	1.68	.89	217.87	2.78	1.17	253.	347.
12.000	.014	.005	1.91	224.97	1.35	-.03	211.10	2.35	.35	197.	342.
13.000	.006	.002	.90	216.77	1.37	.04	204.77	2.26	-.45	123.	338.
14.000	.002	.001	.42	208.71	1.36	-.01	196.49	2.53	-.52	26.	335.
15.000	.001	.000	.69	201.20	1.37	-.04	189.82	2.66	.23	9.	330.
16.000	99.999	99.999	999.99	194.94	1.38	.08	999.99	99.99	999.99	0.	248.
17.000	99.999	99.999	999.99	191.26	1.72	-.01	999.99	99.99	999.99	0.	248.
18.000	99.999	99.999	999.99	192.88	2.96	-.04	999.99	99.99	999.99	0.	248
19.000	99.999	99.999	999.99	199.33	2.71	-.26	999.99	99.99	999.99	0.	247.
20.000	99.999	99.999	999.99	204.59	2.54	-.27	999.99	99.99	999.99	0.	245.
21.000	99.999	99.999	999.99	208.57	2.41	-.48	999.99	99.99	999.99	0.	236.
22.000	99.999	99.999	999.99	212.13	2.26	-.22	999.99	99.99	999.99	0.	236.
23.000	99.999	99.999	999.99	215.01	1.99	.03	999.99	99.99	999.99	0.	227.
24.000	99.999	99.999	999.99	217.76	2.30	.31	999.99	99.99	999.99	0.	225
25.000	99.999	99.999	999.99	219.84	2.51	.07	999.99	99.99	999.99	0.	225.
26.000	99.999	99.999	999.99	221.90	2.30	.17	999.99	99.99	999.99	0.	219.
27.000	99.999	99.999	999.99	223.07	2.49	.29	999.99	99.99	999.99	0.	204.
28.000	99.999	99.999	999.99	225.81	2.58	.23	999.99	99.99	999.99	0.	204.
29.000	99.999	99.999	999.99	227.67	2.72	.16	999.99	99.99	999.99	0.	189.
30.000	99.999	99.999	999.99	229.75	2.62	.01	999.99	99.99	999.99	0.	186.

TABLE III. 3 MOISTURE RELATED STATISTICAL PARAMETERS, MARCH

STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	VAPOR P MEAN MB	S.D. VP MB	SKEW VP	TV MEAN DEG K	TV S.D. DEG K	SKEW TV	DEWPT T MEAN DEG K	S.D. DPT DEG K	SKEW DPT	NOBS T+P	NOBS TV
.000	28.701	2.034	-.44	305.19	1.18	-1.36	296.47	1.20	-.64	405.	405.
.002	28.644	2.029	-.39	305.17	1.17	-1.32	296.44	1.19	-.59	419.	420.
1.000	16.303	2.874	.01	295.21	1.00	.17	287.24	2.82	-.50	420.	421.
2.000	9.608	3.466	-.20	290.01	1.09	-.12	278.46	6.40	-1.18	407.	421.
3.000	5.271	2.706	.24	285.23	1.23	.45	269.25	7.99	-.51	387.	421.
4.000	3.137	1.831	.53	279.65	1.34	.34	262.16	8.18	-.29	374.	421.
5.000	1.909	1.310	.90	274.05	1.45	.49	255.62	8.42	.06	368.	421.
6.000	1.111	.790	1.20	268.44	1.58	.15	249.46	7.73	.25	357.	421.
7.000	.600	.397	1.54	262.40	1.47	.23	243.27	6.37	.38	353.	417.
8.000	.314	.192	1.85	256.07	1.50	.12	237.04	5.20	.60	337.	405.
9.000	.151	.091	2.23	249.09	1.57	.22	230.86	4.31	.83	325.	388.
10.000	.076	.035	2.18	241.45	1.69	.37	224.44	3.47	.54	254.	377.
11.000	.035	.016	2.41	233.28	1.71	.35	218.07	2.97	.84	246.	375.
12.000	.014	.005	2.34	224.87	1.48	-.17	211.26	2.19	1.04	193.	367.
13.000	.006	.002	1.39	216.69	1.47	-.20	204.75	2.18	.04	113.	360.
14.000	.002	.001	1.25	208.63	1.40	-.25	196.75	2.44	.00	21.	354.
15.000	.001	.000	-.12	201.20	1.23	.15	189.69	2.59	-.43	9.	351.
16.000	99.999	99.999	999.99	195.04	1.39	.04	999.99	99.99	999.99	0.	272.
17.000	99.999	99.999	999.99	191.54	2.05	-.01	999.99	99.99	999.99	0.	272.
18.000	99.999	99.999	999.99	193.26	3.47	.04	999.99	99.99	999.99	0.	274.
19.000	99.999	99.999	999.99	199.78	2.83	-.01	999.99	99.99	999.99	0.	269.
20.000	99.999	99.999	999.99	205.14	2.55	.11	999.99	99.99	999.99	0.	265.
21.000	99.999	99.999	999.99	209.49	2.31	.38	999.99	99.99	999.99	0.	251.
22.000	99.999	99.999	999.99	213.03	2.23	.02	999.99	99.99	999.99	0.	250.
23.000	99.999	99.999	999.99	215.85	1.75	-.11	999.99	99.99	999.99	0.	241.
24.000	99.999	99.999	999.99	218.33	2.25	-.04	999.99	99.99	999.99	0.	245.
25.000	99.999	99.999	999.99	220.55	2.17	-.31	999.99	99.99	999.99	0.	243.
26.000	99.999	99.999	999.99	222.75	2.17	-.65	999.99	99.99	999.99	0.	234.
27.000	99.999	99.999	999.99	224.82	2.09	-.62	999.99	99.99	999.99	0.	205.
28.000	99.999	99.999	999.99	226.87	2.13	-.57	999.99	99.99	999.99	0.	203.
29.000	99.999	99.999	999.99	229.08	2.09	.08	999.99	99.99	999.99	0.	174.
30.000	99.999	99.999	999.99	231.22	1.94	.21	999.99	99.99	999.99	0.	172.

TABLE III. 4 MOISTURE RELATED STATISTICAL PARAMETERS. APRIL
STATION = 913660 KWAJALEIN MISSLE RANGE

Z	VAPOR P MEAN	S.D. VP	SKEW VP	TV MEAN	TV S.D.	SKEW TV	DEWPT T MEAN	S.D. DPT	SKEW DPT	NOBS T+P	NOBS TV
KM	MB	MB		DEG K	DEG K		DEG K	DEG K			
.000	29.578	1.982	-.56	305.07	1.44	-1.01	296.98	1.14	-.84	418.	418.
.002	29.531	1.993	-.54	305.05	1.47	-1.09	296.95	1.15	-.81	427.	429.
1.000	17.231	2.792	-.09	295.70	.91	-.01	288.13	2.63	-.73	427.	428.
2.000	10.880	3.049	-.51	290.36	1.03	.31	280.71	4.96	-1.49	419.	428.
3.000	6.561	2.530	-.32	285.07	1.00	.10	272.91	6.58	-1.15	409.	428.
4.000	4.201	1.960	-.10	279.30	.95	.00	266.43	7.58	-.80	398.	428.
5.000	2.591	1.437	.29	273.61	1.04	.37	259.65	8.02	-.43	395.	428.
6.000	1.529	.924	.56	268.02	1.03	.34	[illegible]	7.90	-.25	[illegible]	[illegible]
7.000	.869	.541	.74	261.94	1.15	.25	247.02	7.31	-.10	378.	426.
8.000	.443	.289	1.03	255.62	1.23	.16	239.95	6.62	.18	365.	420.
9.000	.214	.133	1.24	248.72	1.37	.56	233.10	5.56	.33	357.	414.
10.000	.095	.057	1.59	241.02	1.35	.39	225.94	4.71	.26	261.	398.
11.000	.040	.020	1.92	232.86	1.34	.14	218.82	3.62	.47	260.	398.
12.000	.016	.007	1.65	224.48	1.37	.03	211.71	2.99	.26	193.	385.
13.000	.006	.002	.79	216.16	1.49	-.09	204.55	3.08	-.73	105.	375.
14.000	.001	.001	.18	208.13	1.54	-.20	194.84	3.23	-.22	13.	370.
15.000	99.999	99.999	999.99	201.01	1.40	-.15	999.99	99.99	999.99	4.	355.
16.000	99.999	99.999	999.99	195.53	1.35	-.09	999.99	99.99	999.99	0.	277.
17.000	99.999	99.999	999.99	192.50	1.76	-.02	999.99	99.99	999.99	0.	269.
18.000	99.999	99.999	999.99	194.34	2.58	-.05	999.99	99.99	999.99	0.	268.
19.000	99.999	99.999	999.99	200.71	2.55	.08	999.99	99.99	999.99	0.	266.
20.000	99.999	99.999	999.99	206.32	2.10	.13	999.99	99.99	999.99	0.	260.
21.000	99.999	99.999	999.99	210.60	1.96	.10	999.99	99.99	999.99	0.	250.
22.000	99.999	99.999	999.99	213.81	2.09	.33	999.99	99.99	999.99	0.	249.
23.000	99.999	99.999	999.99	216.53	1.86	.13	999.99	99.99	999.99	0.	244.
24.000	99.999	99.999	999.99	219.07	2.25	.34	999.99	99.99	999.99	0.	244.
25.000	99.999	99.999	999.99	221.50	2.17	.12	999.99	99.99	999.99	0.	239.
26.000	99.999	99.999	999 99	223.95	1.94	.06	999.99	99.99	999.99	0.	227.
27.000	99.999	99.999	999.99	[illegible]	[illegible]	-.08	999.99	99.99	999.99	0.	193.
28.000	99.999	99.999	999.99	228.21	1.67	-.19	999.99	99.99	999.99	0.	190.
29.000	99.999	99.999	993.99	230.11	1.73	.00	999.99	99.99	999.93	0.	163.
30.000	99.999	99.999	999.99	232.16	1.46	-.30	999.99	99.99	999.99	0.	160.

TABLE III. 5 MOISTURE RELATED STATISTICAL PARAMETERS. ·MAY

STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	VAPOR P MEAN MB	S.D. VP MB	SKEW VP	TV MEAN DEG K	TV S.D. DEG K	SKEW TV	DEWPT T MEAN DEG K	S.D. DPT DEG K	SKEW DPT	NOBS T+P	NOBS TV
.000	30.711	1.658	-.44	305.20	1.37	-1.09	297.51	.92	-.61	438.	438.
.002	30.702	1.654	-.44	305.19	1.37	-1.10	297.61	.91	-.61	440.	440.
1.000	18.102	2.473	.00	296.14	.91	-.56	288.96	2.17	-.30	440.	441.
2.000	11.623	2.595	-.62	290.70	1.05	-.28	281.93	3.90	-1.77	439.	441.
3.000	7.312	2.066	-.39	285.24	.96	-.26	275.04	4.69	-1.35	431.	440.
4.000	4.731	1.544	-.20	279.29	.98	-.04	268.89	5.25	-1.33	431.	440.
5.000	2.974	1.259	.10	273.52	.93	-.36	262.39	6.40	-.95	429.	440.
6.000	1.724	.861	.36	267.81	1.05	-.58	255.38	6.84	-.58	420.	440.
7.000	.933	.513	.50	261.78	1.12	-.25	248.17	6.77	-.30	405.	439.
8.000	.495	.277	.68	255.43	1.15	-.11	241.44	6.17	-.11	391.	431.
9.000	.245	.137	.92	248.30	1.27	-.05	234.55	5.45	.03	384.	425.
10.000	.110	.055	1.24	240.73	1.33	.08	227.41	4.27	.23	283.	414.
11.000	.045	.022	1.80	232.66	1.37	-.12	219.82	3.51	.74	270.	411.
12.000	.017	.007	1.86	224.34	1.35	-.16	212.18	2.84	.65	203.	395.
13.000	.006	.002	1.08	216.08	1.37	-.30	205.06	2.61	.00	97.	389.
14.000	.002	.001	.25	208.10	1.39	-.41	197.10	2.15	-.68	30.	376.
15.000	99.999	99.999	999.99	201.06	1.41	.17	999.99	99.99	999.99	3.	370.
16.000	99.999	99.999	999.99	196.07	1.53	.16	999.99	99.99	999.99	0.	281.
17.000	99.999	99.999	999.99	194.12	1.80	-.04	999.99	99.99	999.99	0.	277.
18.000	99.999	99.999	999.99	196.62	2.00	-.18	999.99	99.99	999.99	0.	274.
19.000	99.999	99.999	999.99	202.24	2.06	-.29	999.99	99.99	999.99	0.	272.
20.000	99.999	99.999	999.99	207.27	1.88	-.32	999.99	99.99	999.99	0.	269.
21.000	99.999	99.999	999.99	211.13	1.75	-.07	999.99	99.99	999.99	0.	252.
22.000	99.999	99.999	999.99	214.03	1.80	.09	999.99	99.99	999.99	0.	252.
23.000	99.999	99.999	999.99	216.67	1.70	.16	999.99	99.99	999.99	0.	238.
24.000	99.999	99.999	999.99	219.26	1.99	-.01	999.99	99.99	999.99	0.	240.
25.000	99.999	99.999	999.99	221.90	1.89	.18	999.99	99.99	999.99	0.	232.
26.000	99.999	99.999	999.99	224.34	1.65	.28	999.99	99.99	999.99	0.	218.
27.000	99.999	99.999	999.99	226.58	1.64	-.06	999.99	99.99	999.99	0.	195.
28.000	99.999	99.999	999.99	228.68	1.66	.01	999.99	99.99	999.99	0.	191.
29.000	99.999	99.999	999.99	230.68	1.85	-.04	999.99	99.99	999.99	0.	172.
30.000	99.999	99.999	999.99	232.58	1.73	-.17	999.99	99.99	999.99	0.	167.

TABLE III. 6 MOISTURE RELATED STATISTICAL PARAMETERS, JUNE

STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	VAPOR P MEAN MB	S.D. VP MB	SKEW VP	TV MEAN DEG K	TV S.D. DEG K	SKEW TV	DEWPT T MEAN DEG K	S.D. DPT DEG K	SKEW DPT	NOBS T+P	NOBS TV
.000	30.604	1.557	-.65	305.27	1.32	-1.24	297.56	.87	-.80	394.	394.
.002	30.592	1.554	-.64	305.23	1.35	-1.22	297.55	.86	-.79	397.	398.
1.000	17.709	2.442	.22	296.16	.78	-.01	288.61	2.17	-.16	395.	399.
2.000	11.309	2.561	-.70	290.51	.91	-.08	281.51	4.03	-1.90	397.	399.
3.000	6.929	2.165	-.61	285.01	.97	-.24	274.06	5.60	-1.65	396.	399.
4.000	4.453	1.540	-.34	279.11	1.03	.20	267.95	5.69	-1.29	393.	399.
5.000	2.827	1.176	-.02	273.31	.98	.57	261.79	6.31	-.95	387.	393.
6.000	1.619	.776	.34	267.58	1.03	.31	254.78	6.46	-.58	370.	393.
7.000	.881	.467	.63	261.49	1.12	.63	247.71	6.32	-.27	364.	389.
8.000	.447	.241	.77	255.02	1.22	.76	240.57	5.76	-.09	360.	387.
9.000	.216	.122	1.00	248.02	1.41	.91	233.34	5.33	.14	343.	377.
10.000	.097	.054	1.19	240.37	1.49	1.35	226.14	4.64	.32	232.	366.
11.000	.038	.020	1.55	232.13	1.38	.14	218.42	3.69	.62	227.	360.
12.000	.014	.007	1.58	223.76	1.35	.18	211.03	3.07	.45	197.	356.
13.000	.005	.002	1.06	215.45	1.41	.14	203.63	3.14	-.32	79.	348.
14.000	.002	.001	.34	207.55	1.47	.22	195.67	3.31	-.55	26.	341.
15.000	99.999	99.999	999.99	200.81	1.65	.04	999.99	99.99	999.99	0.	337.
16.000	99.999	99.999	999.99	196.63	1.70	.13	999.99	99.99	999.99	0.	254.
17.000	99.999	99.999	999.99	196.00	2.18	.08	999.99	99.99	999.99	0.	250.
18.000	99.999	99.999	999.99	193.60	2.42	-.08	999.99	99.99	999.99	0.	249.
19.000	99.999	99.999	999.99	204.14	1.95	-.23	999.99	99.99	999.99	0.	249.
20.000	99.999	99.999	999.99	208.36	1.70	.01	999.99	99.99	999.99	0.	247.
21.000	99.999	99.999	999.99	211 79	1.67	-.14	999.99	99.99	999.99	0.	236.
22.000	99.999	99.999	999.99	214.27	1.92	-,09	999.99	99.99	999.99	0.	235.
23.000	99.999	99.999	999.99	216.81	1.66	-.17	999.99	99.99	999.99	0.	229.
24.000	99.999	99.999	999.99	219.42	1.89	.07	999.99	99.99	999.99	0.	228.
25.000	99.999	99.999	999.99	221.82	1.83	.05	999.99	99.99	999.99	0.	228.
26.000	99 999	99.999	999.99	224.13	1.72	-.23	999.99	99.99	999.99	0.	217.
27.000	99.999	99.999	999.99	226.45	1.64	.02	999.99	99.99	999.99	0.	197.
28.000	99.999	99.999	999.99	228.48	1.78	-.29	999.99	99.99	999.99	0.	184.
29.000	99.999	99.999	999.99	230.44	2.01	-.06	999.99	99.99	999.99	0.	164.
30.000	99.999	99.999	999.99	231.89	2.12	-.15	999.99	99.99	999.99	0.	153.

TABLE III. 7 MOISTURE RELATED STATISTICAL PARAMETERS, JULY
STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	VAPOR P MEAN MB	S.D. VP MB	SKEW VP	TV MEAN DEG K	TV S.D. DEG K	SKEW TV	DEWPT T MEAN DEG K	S.D. DPT DEG K	SKEW DPT	NOBS T+P	NOES
.000	30.617	1.412	-.27	305.20	1.36	-1.15	297.57	.78	-.43	399.	399.
.002	30.611	1.411	-.27	305.19	1.35	-1.15	297.57	.78	-.43	400.	400.
1.000	17.933	2.336	-.04	296.24	.76	-.26	268.82	2.08	-.45	400.	400.
2.000	11.727	2.285	-.49	290.55	.87	-.09	282.18	3.22	-1.37	399.	400.
3.000	7.350	1.900	-.59	285.03	.88	-.22	275.20	4.32	-1.49	398.	400.
4.000	4.732	1.444	-.46	279.10	.90	.16	268.97	5.00	-1.44	395.	400.
5.000	3.028	1.075	-.04	273.32	.94	-.51	263.02	5.28	-1.02	395.	400.
6.000	1.775	.705	.13	267.62	.90	-.04	255.31	5.45	-.77	386.	400.
7.000	.931	.405	.52	261.56	.97	.04	248.82	5.21	-.39	380.	398.
8.000	.475	.228	.81	255.07	.99	-.01	241.48	5.16	-.30	375.	394.
9.000	231	.119	1.09	247.99	1.09	-.15	234.23	4.89	.01	363.	382.
10.000	.099	.049	1.18	240.26	1.21	-.13	225.56	4.24	.08	259.	367.
11.000	.039	.017	1.54	232.15	1.31	-.03	218.89	3.21	.68	248.	358.
12.000	.014	.006	1.97	223.67	1.31	.05	211.01	2.64	.79	216.	352.
13.000	.005	.002	1.70	215.34	1.32	.16	203.90	2.96	.09	74.	341.
14.000	.002	.001	2.01	207.32	1.38	.26	195.43	2.94	.72	33.	335.
15.000	.001	.000	.78	200.54	1.50	-.26	189.06	4.11	.36	7.	334.
16.000	99.999	99.999	999.99	196.84	1.75	-.45	999.99	99.99	999.99	0.	269.
17.000	99.999	99.999	999.99	197.39	2.27	-.28	999.99	99.99	999.99	0.	263.
18.000	99.999	99.999	999.99	202.28	2.24	.41	999.99	99.99	999.99	0.	261.
19.000	99.999	99.999	999.99	206.44	1.81	.08	999.99	99.99	999.99	0.	256.
20.000	99.999	99.999	999.99	209.84	1.65	.07	999.99	99.99	999.99	0.	249.
21.000	99.999	99.999	999.99	212.45	1.82	-.06	999.99	99.99	999.99	0.	233.
22.000	99.999	99.999	999.99	214.64	1.82	.02	999.99	99.99	999.99	0.	238.
23.000	99.999	99.999	999.99	216.89	1.82	.14	999.99	99.99	999.99	0.	226.
24.000	99.999	99.999	999.99	219.19	2.08	.21	999.99	99.99	999.99	0.	224.
25.000	99.999	99.999	999.99	221.58	1.94	.01	999.99	99.99	999.99	0.	217.
26.000	99.999	99.999	999.99	223.77	1.81	-.07	999.99	99.99	999.99	0.	202.
27.000	99.999	99.999	999.99	225.76	2.03	.11	999.99	99.99	999.99	0.	169.
28.000	99.999	99.999	999.99	227.66	2.10	.06	999.99	99.99	999.99	0.	167.
29.000	99.999	99.999	999.99	229.26	2.33	-.16	999.99	99.99	999.99	0.	140.
30.000	99.999	99.999	999.99	230.58	2.22	-.18	999.99	99.99	999.99	0.	138.

TABLE III. 8 MOISTURE RELATED STATISTICAL PARAMETERS, AUGUST
STATION = 913660 KHAJALEIN MISSLE RANGE

Z KM	VAPOR P MEAN MB	S.D. VP MB	SKEW VP	TV MEAN DEG K	TV S.D. DEG K	SKEW TV	DEWPT T MEAN DEG K	S.D. DPT DEG K	SKEW DPT	NOBS T+P	NOBS TV
.000	30.476	1.504	.14	305.31	1.40	-.80	297.49	.82	-.02	421.	421.
.002	30.466	1.499	.14	305.30	1.39	-.81	297.48	.82	-.02	424.	424.
1.000	17.717	2.293	.06	296.21	.76	.47	288.63	2.05	-.27	423.	425.
2.000	11.753	2.110	-.48	290.43	.88	.55	282.26	2.95	-1.46	422.	425.
3.000	7.255	1.860	-.51	284.93	.88	.15	275.03	4.28	-1.57	420.	425.
4.000	4.618	1.455	-.17	278.99	.84	.14	268.57	4.85	-1.05	418.	424.
5.000	2.822	1.158	.20	273.13	.82	.30	261.86	6.00	-.88	419.	424.
6.000	1.346	.799	.69	267.42	.92	.60	255.07	6.15	-.41	410.	423.
7.000	.883	.475	1.05	261.39	.98	.47	247.89	5.85	.07	405.	421.
8.000	.459	.268	1.23	254.92	1.07	.60	240.77	5.75	.20	396.	418.
9.000	.218	.126	1.45	247.81	1.20	.55	233.51	5.08	.36	381.	411.
10.000	.099	.059	1.59	240.06	1.39	1.82	226.21	4.72	.48	266.	408.
11.000	.039	.022	2.10	231.92	1.27	-.12	218.62	3.80	.85	257.	400
12.000	.014	.007	2.77	223.45	1.22	.05	210.90	2.97	1.04	235.	385.
13.000	.006	.003	2.52	215.05	1.17	-.03	204.13	3.28	.67	72.	376.
14.000	.001	.001	1.64	207.02	1.19	.01	194.88	2.31	.73	22.	359.
15.000	.001	.000	.57	200.50	1.33	.08	190.23	2.58	-.22	9.	362.
16.000	99.999	99.999	999.99	197.59	1.74	-.27	999.99	99.99	999.99	0.	268.
17.000	99.999	99.999	999.99	198.44	2.30	-.40	999.99	99.99	999.99	0.	265.
18.000	99.999	99.999	999.99	202.77	2.11	.07	999.99	99.99	999.99	0.	266.
19.000	99.999	99.999	999.99	206.61	2.06	-.05	999.99	99.99	999.99	0.	263.
20.000	99.999	99.999	999.99	209.47	2.11	.04	999.99	99.99	999.99	0.	259.
21.000	99.999	99.999	999.99	211.96	2.10	.06	999.99	99.99	999.99	0.	252.
22.000	99.999	99.999	999.99	214.20	2.02	-.29	999.99	99.99	999.99	0.	251.
23.000	99.999	99.999	999.99	216.37	1.92	-.35	999.99	99.99	999.99	0.	243.
24.000	99.999	99.999	999.99	218.54	2.09	-.55	999.99	99.99	999.99	0.	243.
25.000	99.999	99.999	999.99	220.83	1.99	-.08	999.99	99.99	999.99	0.	239.
26.000	99.999	99.999	999.99	222.94	1.97	-.14	999.99	99.99	999.99	0.	228.
27.000	99.999	99.999	999.99	[illegible]	2.16	.11	999.99	99.99	999.99	0.	[illegible]
28.000	99.999	99.999	999.99	227.00	1.93	.14	999.99	99.99	999.99	0.	192.
29.000	99.999	99.999	999.99	228.73	2.28	.19	999.99	99.99	999.99	0.	156.
30.000	99.999	99.999	999.99	230.00	2.41	-.02	999.99	99.99	999.99	0.	154.

TABLE III. 9 MOISTURE RELATED STATISTICAL PARAMETERS. **SEPTEMBER**

STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	VAPOR P MEAN MB	S.D. VP MB	SKEW VP	TV MEAN DEG K	TV S.D. DEG K	SKEW TV	DEWPT T MEAN DEG K	S.D. DPT DEG K	SKEW DPT	NOBS T+P	NOBS TV
.000	30.487	1.590	-.30	305.40	1.55	-.68	297.49	.88	-.45	420.	420.
.002	30.472	1.585	-.30	305.38	1.56	-.68	297.49	.88	-.45	423.	423.
1.000	17.521	2.638	-.21	296.37	.79	-.29	288.77	2.41	-.84	423.	423.
2.000	11.962	2.353	-.31	290.51	.93	.01	282.48	3.22	-1.25	420.	423.
3.000	7.604	1.879	-.38	285.00	.91	.03	275.74	4.04	-1.45	420.	423.
4.000	4.839	1.586	-.37	279.06	.91	.02	269.15	5.45	-1.47	420.	423.
5.000	3.103	1.207	-.04	273.28	.90	.13	263.12	5.95	-1.04	420.	423.
6.000	1.802	.819	.25	267.58	.89	.11	256.16	6.31	-.71	418.	424.
7.000	.955	.484	.51	261.59	.96	.41	248.80	6.28	-.50	412.	424.
8.000	.516	.271	.81	255.23	1.09	.67	242.07	5.88	-.31	399.	423.
9.000	.252	.135	.99	248.18	1.21	.69	234.93	5.28	-.04	387.	419.
10.000	.113	.063	1.08	240.52	1.28	.79	227.42	4.85	.19	250.	407.
11.000	.045	.024	1.30	232.42	1.36	.98	219.59	4.23	.21	254.	402.
12.000	.016	.008	1.81	223.93	1.24	.52	211.77	3.28	.47	224.	397.
13.000	.006	.003	1.42	215.50	1.23	.49	204.89	2.97	.23	92.	383.
14.000	.002	.001	.27	207.44	1.34	.62	196.80	2.06	-.41	35.	370.
15.000	.001	.000	.49	200.69	1.40	.48	190.28	2.19	-.03	8.	358.
16.000	99.999	99.999	999.99	197.09	1.68	-.33	999.99	99.99	999.99	0.	254.
17.000	99.999	99.999	999.99	197.21	2.37	-.53	999.99	99.99	999.99	0.	250.
18.000	99.999	99.999	999.99	201.41	2.53	.12	999.99	99.99	999.99	0.	248.
19.000	99.999	99.999	999.99	205.57	2.26	.06	999.99	99.99	999.99	0.	244.
20.000	99.999	99.999	999.99	208.75	2.22	.13	999.99	99.99	999.99	0.	241.
21.000	99.999	99.999	999.99	211.33	2.04	.37	999.99	99.99	999.99	0.	233.
22.000	99.999	99.999	999.99	213.41	1.87	.29	999.99	99.99	999.99	0.	233.
23.000	99.999	99.999	999.99	215.95	1.74	.17	999.99	99.99	999.99	0.	229.
24.000	99.999	99.999	999.99	218.57	2.09	.19	999.99	99.99	999.99	0.	230.
25.000	99.939	99.999	999.99	220.78	2.00	-.14	999.99	99.99	999.99	0.	223.
26.000	99.999	99.999	999.99	222.91	1.94	-.28	999.99	99.99	999.99	0.	215.
27.000	99.999	99.999	999.99	225.06	2.18	.04	999.99	99.99	3.99	0.	200.
28.000	99.999	99.999	999.99	227.30	1.82	-.08	999.99	99.99	999.99	0.	195.
29.000	99.999	99.999	999.99	229.21	2.08	.00	999.99	99.99	999.99	0.	158.
30.000	99.999	99.999	999.99	230.92	1.94	-.29	999.99	99.99	999.99	0.	159.

TABLE III. 10 MOISTURE RELATED STATISTICAL PARAMETERS. OCTOBER
STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	VAPOR P MEAN MB	S.D. VP MB	SKEW VP	TV MEAN DEG K	TV S.D. DEG K	SKEW TV	DEWPT T MEAN DEG K	S.D. DPT DEG K	SKEW DPT	NOBS T+P	NOBS TV
.000	30.264	1.538	-.34	305.30	1.46	-1.03	297.37	.96	-.52	438.	438.
.002	30.249	1.539	-.34	305.26	1.49	-1.05	297.36	.96	-.52	440.	442.
1.000	18.200	2.568	-.09	295.31	.84	.36	289.03	2.28	-.61	439.	442.
2.000	12.043	2.338	-.28	290.52	.96	.40	282.59	3.15	-1.14	440.	442.
3.000	7.463	1.989	-.43	285.05	.95	.00	275.38	4.51	-1.69	438.	442.
4.000	4.836	1.567	-.33	279.13	.92	.18	269.17	5.30	-1.54	437.	442.
5.000	3.078	1.281	.03	273.33	.95	.41	262.86	6.35	-.96	435.	442.
6.000	1.622	.872	.39	267.67	1.05	.33	255.10	6.01	-.57	426.	[illegible]
7.000	1.002	.547	.68	261.67	1.05	.05	249.02	6.68	-.39	414.	439.
8.000	.540	.306	.72	255.30	1.12	.50	242.32	6.29	-.15	400.	437.
9.000	.261	.152	.88	248.32	1.31	.66	235.05	5.70	.08	392.	435.
10.000	.119	.071	.98	240.60	1.43	.59	227.70	5.27	.18	297.	426.
11.000	.047	.027	1.37	232.40	1.39	-.17	219.90	4.35	.40	280.	418.
12.000	.017	.009	1.53	224.00	1.38	-.41	212.26	3.48	.52	245.	411.
13.000	.006	.003	1.62	215.68	1.34	-.49	204.87	3.41	.31	111.	394.
14.000	.002	.001	.88	207.75	1.38	-.32	196.27	3.04	-.29	40.	380.
15.000	.001	.000	-.19	200.90	1.41	.07	190.95	1.95	-.48	8.	374.
16.000	99.999	99.999	999.99	196.40	1.64	.23	999.99	99.99	999.99	0.	263.
17.000	99.999	99.999	999.99	195.41	2.06	-.07	999.99	99.99	999.99	0.	262.
18.000	99.999	99.999	999.99	198.94	2.76	-.14	999.99	99.99	999.99	0.	263.
19.000	99.999	99.999	999.99	203.80	2.46	-.20	999.99	99.99	999.99	0.	263.
20.000	99.999	99.999	999.99	207.62	2.37	.00	999.99	99.99	999.99	0.	259.
21.000	99.999	99.999	999.99	210.66	2.32	-.01	999.99	99.99	999.99	0.	243.
22.000	99.999	99.999	999.99	213.17	2.21	-.09	999.99	99.99	999.99	0.	243.
23.000	99.999	99.999	999.99	215.73	2.05	-.43	999.99	99.99	999.99	0.	237.
24.000	99.999	99.999	999.99	218.37	2.16	-.32	999.99	99.99	999.99	0.	241.
25.000	99.999	99.999	999.99	220.98	1.92	-.49	999.99	99.99	999.99	0.	241.
26.000	99.999	99.999	999.99	223.56	1.76	-.06	999.99	99.99	999.99	0.	236.
27.000	99.999	99.999	999.99	225.97	2.05	.29	999.99	99.99	999.99	0.	211.
28.000	99.999	99.999	999.99	228.02	1.96	.10	999.99	99.99	999.99	0.	209.
29.000	99.999	99.999	999.99	229.84	2.20	-.25	999.99	99.99	999.99	0.	182.
30.000	99.999	99.999	999.99	231.81	2.20	-.19	999.99	99.99	999.99	0.	179.

TABLE III. 11 MOISTURE RELATED STATISTICAL PARAMETERS. **NOVEMBER**

STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	VAPOR P MEAN MB	S.D. VP MB	SKEW VP	TV MEAN DEG K	TV S.D. DEG K	SKEW TV	DEWPT T MEAN DEG K	S.D. DPT DEG K	SKEW DPT	NOBS T+P	NOBS TV
.000	29.953	1.707	-.29	305.19	1.55	-.84	297.19	.96	-.54	411.	411.
.002	29.926	1.716	-.29	305.17	1.55	-.84	297.18	.97	-.54	415.	415.
1.000	17.898	2.885	-.12	296.15	.95	-.28	288.72	2.62	-.65	414.	416.
2.000	11.552	2.805	-.61	290.57	1.05	-.19	281.76	4.32	-1.79	412.	416.
3.000	6.998	2.455	-.34	285.20	1.07	-.26	274.02	6.12	-1.37	405.	416.
4.000	4.327	1.821	.00	279.38	1.14	-.09	267.20	5.53	-.87	397.	416.
5.000	2.377	1.366	.30	273.61	1.15	.24	259.95	7.69	-.54	396	[illegible]
6.000	1.452	.877	.67	267.82	1.19	-.16	252.80	7.77	-.32	386.	416.
7.000	.810	.518	.89	261.73	1.22	-.06	246.28	7.1[illegible]	.02	377.	415.
8.000	.437	.281	1.07	255.31	1.29	.19	239.69	6.46	.16	373.	415.
9.000	[illegible]	.170	1.17	[illegible]	[illegible]	.19	233.29	5.73	.30	370.	410.
10.000	.098	.060	1.41	240.67	1.53	.35	226.02	4.87	.57	294.	399.
11.000	.039	.022	1.93	232.54	1.51	-.46	218.60	3.92	.65	290.	394.
12.000	.016	.008	1.88	224.25	1.49	-.99	211.45	3.42	.56	259.	385.
13.000	.006	.003	1.02	216.04	1.53	-1.16	204.70	3.43	-.31	129.	370.
14.000	.002	.001	1.83	208.09	1.54	-1.25	196.35	3.52	.13	32.	363.
15.000	99.999	99.999	999.99	200.99	1.50	-.92	999.99	99.99	999.99	4.	356.
16.000	99.999	99.999	999.99	195.48	1.38	.01	999.99	99.99	999.99	0.	264.
17.000	99.999	99.999	999.99	192.63	1.66	-.01	999.99	99.99	999.99	0.	262.
18.000	99.999	99.999	999.99	194.84	2.52	.09	999.99	99.99	999.99	0.	252.
19.000	99.999	99.999	999.99	201.59	2.54	-.26	999.99	99.99	999.99	0.	260.
20.000	99.999	99.999	999.99	206.49	2.35	-.33	999.99	99.99	999.99	0.	258.
21.000	99.999	99.999	999.99	209.91	2.22	-.34	999.99	99.99	999.99	0.	245.
22.000	99.999	99.999	999.99	212.61	2.13	-.19	999.99	99.99	999.99	0.	243.
23.000	99.999	99.999	999.99	215.46	1.64	.06	999.99	99.99	999.99	0.	237.
24.000	99.999	99.999	999.99	218.24	2.05	.17	999.99	99.99	999.99	0.	242.
25.000	99.999	99.999	999.99	221.22	2.10	.23	999.99	99.99	999.99	0.	234.
26.000	99.999	99.999	999.99	223.83	1.86	.33	999.99	99.99	999.99	0.	226.
27.000	99.929	99.999	999.99	226.31	2.16	.17	999.99	99.99	999.99	0.	208.
28.000	99.999	99.999	999.99	228.62	2.22	-.27	999.99	99.99	999.99	0.	207.
29.000	99.999	99.999	999.99	230.79	2.46	-.53	999.99	99.99	999.99	0.	163.
30.000	99.999	99.999	999.99	232.51	2.14	-.43	999.99	99.99	999.99	0.	161.

TABLE III. 12 MOISTURE RELATED STATISTICAL PARAMETERS, DECEMBER
STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	VAPOR P MEAN MB	S.D. VP MB	SKEW VP	TV MEAN DEG K	TV S.D. DEG K	SKEW TV	DEWPT T MEAN DEG K	S.D. DPT DEG K	SKEW DPT	NOBS T+P	NOBS TV
.000	28.987	1.928	-.53	304.87	1.17	-1.10	296.64	1.13	-.74	410.	410.
.002	28.931	1.949	-.50	304.85	1.17	-1.09	296.61	1.14	-.70	421.	422.
1.000	17.068	3.092	-.14	295.56	1.15	.10	287.93	2.97	-.77	420.	422.
2.000	10.135	3.667	-.30	290.48	1.29	-.16	279.21	6.51	-1.22	412.	423.
3.000	5.835	2.971	.13	285.54	1.19	-.42	270.57	8.20	-.55	392.	423.
4.000	3.500	2.104	.52	279.93	1.21	.09	263.45	8.36	-.11	369.	423.
5.000	2.150	1.524	.80	274.17	1.26	.16	256.84	8.78	.18	367.	422.
6.000	1.198	.910	1.12	268.35	1.29	.07	249.99	8.21	.39	363.	421.
7.000	.658	.493	1.39	262.26	1.30	.35	243.73	7.11	.58	356.	420.
8.000	.364	.260	1.54	255.81	1.28	.25	237.94	6.32	.53	354.	410.
9.000	.192	.131	1.57	248.84	1.40	.39	231.94	5.65	.55	348.	397.
10.000	.094	.063	1.73	241.22	1.46	.82	225.50	5.10	.62	303.	389.
11.000	.042	.027	2.12	233.14	1.38	.64	218.90	4.22	.78	293.	385.
12.000	.016	.009	2.06	224.85	1.26	.40	211.79	3.44	.89	259.	378.
13.000	.006	.003	1.53	216.60	1.26	.27	204.50	2.75	.41	158.	365.
14.000	.002	.001	.79	208.44	1.35	.06	196.42	2.22	.00	27.	359.
15.000	99.999	99.999	999.99	200.95	1.32	.04	999.99	99.99	999.99	2.	356.
16.000	99.999	99.999	999.99	194.63	1.34	.00	999.99	99.99	999.99	0.	270.
17.000	99.999	99.999	999.99	190.82	1.80	-.53	999.99	99.99	999.99	0.	265.
18.000	99.999	99.999	999.99	192.64	2.71	-.12	999.99	99.99	999.99	0.	264.
19.000	99.999	99.999	999.99	199.78	2.64	-.26	999.99	99.99	999.99	0.	263.
20.000	99.999	99.999	999.99	205.48	2.46	-.44	999.99	99.99	999.99	0.	260.
21.000	99.999	99.999	999.99	209.51	2.12	-.42	999.99	99.99	999.99	0.	252.
22.000	99.999	99.999	999.99	212.74	2.12	-.39	999.99	99.99	999.99	0.	250.
23.000	99.999	99.999	999.99	215.61	1.79	-.36	999.99	99.99	999.99	0.	243.
24.000	99.999	99.999	999.99	218.34	2.24	.08	999.99	99.99	999.99	0.	240.
25.000	99.999	99.999	999.99	220.72	2.14	.21	999.99	99.99	999.99	0.	240.
26.000	99.999	99.999	999.99	222.91	1.94	.28	999.99	99.99	999.99	0.	228.
27.000	99.999	99.999	999.99	225.02	2.12	.61	999.99	99.99	999.99	0.	205.
28.000	99.999	99.999	999.99	226.55	2.03	.24	999.99	99.99	999.99	0.	205.
29.000	99.999	99.999	999.99	228.29	2.08	-.08	999.99	99.99	999.99	0.	178.
30.000	99.999	99.999	999.99	230.18	1.96	.04	999.99	99.99	999.99	0.	177.

TABLE III. 13 MOISTURE RELATED STATISTICAL PARAMETERS, ANNUAL
STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	VAPOR P MEAN MB	S.D. VP MB	SKEW VP	TV MEAN DEG K	TV S.D. DEG K	SKEW TV	DEWPT T MEAN DEG K	S.D. DPT DEG K	SKEW DPT	NOBS T+P	NOBS TV
.000	29.735	2.017	-.64	305.13	1.37	-.90	297.06	1.16	-.90	4944.	4944.
.002	29.693	2.031	-.63	305.10	1.37	-.90	297.04	1.17	-.89	5026.	5033.
1.000	17.345	2.795	-.15	295 79	1.08	-.40	288.23	2.62	-.70	5019.	5038.
2.000	10.896	3.123	-.67	290.39	1.12	-.26	280.66	5.34	-1.80	4958.	5039.
3.000	6.541	2.552	-.35	285.20	1.09	.09	272.81	6.89	-1.21	4819.	5038.
4.000	4.110	1.857	-.07	279.42	1.15	.45	266.24	7.37	-.87	4723.	5036.
5.000	2.555	1.362	.28	273.66	1.20	.61	259.82	7.77	-.53	4692.	5035.
6.000	1.480	.871	.61	267.94	1.23	.45	253.11	7.59	-.26	4583.	[illegible]
7.000	.806	.499	.92	261.90	1.25	.42	246.35	6.90	.00	4495.	4998.
8.000	.425	.267	1.16	255.49	1.30	.43	238.74	6.21	.18	4384.	4925.
9.000	.211	.129	1.35	248.49	1.45	.55	233.06	5.38	.38	4274.	4822.
10.000	.096	.057	1.60	240.81	1.52	.69	225.98	4.64	.49	3220.	4693.
11.000	.040	.022	2.05	232.68	1 53	.39	218.80	3.72	.74	3146.	4627.
12.000	.015	.007	2.11	224.29	1.44	-.06	211.47	3.02	.70	2621.	4527.
13.000	.006	.003	1.61	216.00	1.48	-.07	204.54	2.92	-.01	1269.	4406.
14.000	.002	.001	1.29	207.99	1.49	-.11	196.18	2.81	-.20	327.	4316.
15.000	99.999	99.999	999.99	200.91	1.42	-.08	999.99	99.99	999.99	66.	4246.
16.000	99.999	99.999	999.99	195.88	1.82	.19	999.99	99.99	999.99	0.	3198.
17.000	99.999	99.999	999.99	193.96	3.35	.28	999.99	99.99	999.99	0.	3157.
18.000	99.999	99.999	999.99	196.76	4.67	.00	999.99	99.99	999.99	0.	3151.
19.000	99.999	99.999	999.99	202.40	3.60	-.14	999.99	99.99	999.99	0.	3122.
20.000	99.999	99.999	999.99	206.98	2.82	-.22	999.93	99.99	999.99	0.	3079
21.000	99.999	99.999	999.99	210.49	2.41	-.22	999.99	99.99	999.99	0.	2943.
22.000	99.999	99.999	999.99	213.32	2.22	-.17	999.99	99.99	999.99	0.	2933.
23.000	99.999	99.999	999.99	215.95	1.95	-.09	999.99	99.99	999.99	0.	2837.
24.000	99.999	99.999	999.99	218.50	2.25	-.01	999.99	99.99	999.99	0.	2850.
25.000	99.999	99.999	999.99	220.88	2.27	-.20	999.99	99.99	999.99	0.	2806.
26.000	99.999	99.999	999.99	223.16	2.16	-.25	999.99	99.99	999.99	0.	2689.
27.000	99.999	99.999	999.99	225.30	2.32	-.14	999.99	99.99	999.99	0	2385
28.000	99.999	99.999	999.99	227.33	2.31	-.25	999.99	99.99	999.39	0.	2358.
29.000	99.999	99.999	999.99	229.21	2.49	-.20	999.99	99.99	999.99	0.	2026.
30.000	99.999	99.999	999.99	231.01	2.39	-.26	999.99	99.99	999.99	0.	2002.

TABLE IV.1 HYDROSTATIC MODEL ATMOSPHERE. JANUARY

STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	GEO. HT. KM	P MB	D G/M3	TV DEG K
.000	.000	1010.1000	1155.0000	304.50
.002	.002	1009.8000	1155.0000	304.55
1.000	.997	901.5000	1065.0000	294.75
2.000	1.994	802.3600	964.0000	289.95
3.000	2.991	712.8200	869.6000	285.58
4.000	3.987	631.9900	786.2000	280.04
5.000	4.983	558.9800	709.9000	274.29
6.000	5.979	493.1300	639.8000	268.49
7.000	6.974	433.8300	575.9000	262.41
8.000	7.969	380.5100	517.7000	256.06
9.000	8.964	332.6100	465.1000	249.11
10.000	9.959	289.5900	417.9000	241.43
11.000	10.953	250.9800	374.7000	233.33
12.000	11.947	216.4200	335.2000	224.93
13.000	12.940	185.5900	298.3000	216.74
14.000	13.933	158.2200	264.2000	208.61
15.000	14.926	134.0[illegible]0	232.3000	201.01
16.000	15.919	112.9400	202.4000	194.38
17.000	16.911	94.6980	173.1000	190.53
18.000	17.903	79.3280	143.8000	192.16
19.000	18.895	66.7150	116.7000	199.15
20.000	19.886	56.4130	96.0300	204.65
21.000	20.877	47.8880	79.9500	208.66
22.000	21.868	40.7670	67.0500	211.81
23.000	22.858	34.7940	56.4800	214.53
24.000	23.848	29.7370	47.7300	217.03
25.000	24.838	25.4650	40.5100	218.98
26.000	25.827	21.8390	34.4000	221.16
27.000	26.817	18.7580	29.2600	223.33
28.000	27.805	16.1350	24.9700	225.13
29.000	28.794	13.6960	21.3300	226.93
30.000	29.792	11.9833	18.2400	228.90
32.000	31.7[illegible]7	8.[illegible]	13.3[illegible]0	[illegible]
34.000	33.732	6.7091	9.8060	236.97
36.000	35.705	5.0626	7.2530	241.77
38.000	37.676	3.8451	5.3750	247.76
40.000	39.647	2.9388	4.0190	253.26
42.000	41.616	2.2582	3.0380	257.39
44.000	43.584	1.7432	2.3030	262.12
46.000	45.551	1.3521	1.7550	266.82
48.000	47.517	1.0530	1.3480	270.54
50.000	49.481	.8223	1.0470	271.96
52.000	51.444	.6425	.8189	271.71
54.000	53.406	.5017	.6430	270.23
56.000	55.367	.3910	.5065	267.35
58.000	57.326	.3041	.3976	264.61
60.000	59.284	.2359	.3119	261.86
62.000	61.241	.1824	.2442	258.76
64.000	63.197	.1406	.1912	254.75
66.000	65.152	.1079	.1501	248.80
68.000	67.105	.0824	.1158	246.38
70.000	69.057	.0629	.0882	246.83

TABLE IV. 2 HYDROSTATIC MODEL ATMOSPHERE, **FEBRUARY**

STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	GEO. HT. KM	P MB	D G/M3	TV DEG K
.000	.000	1010.4000	1154.0000	304.89
.002	.002	1010.2000	1154.0000	304.86
1.000	.997	901.8300	1066.0000	294.67
2.000	1.994	802.6600	954.0000	290.05
3.000	2.991	713.1000	870.1000	285.52
4.000	3.987	632.2200	786.5000	280.03
5.000	4.983	559.1900	710.0000	274.36
6.000	5.979	493.3300	639.9000	268.56
7.000	6.974	434.0300	575.9000	262.59
8.000	7.969	380.7100	517.8000	256.15
9,000	8.964	332.8000	465.2000	249.23
10.000	9.959	289.7700	417.9000	241.53
11.000	10.953	251.1500	374.9000	233.35
12.000	11.947	216.5700	335.4000	224.97
13.000	12.940	185.7200	298.5000	216.77
14.000	13.933	158.3400	264.3000	208.71
15.000	14.926	134.1900	232.3000	201.20
16.000	15.919	113.0700	202.1000	194.94
17.000	16.911	94.6660	172.8000	191.26
18.000	17.903	79.5220	143.6000	192.88
19.000	18.895	66.9050	116.9000	199.33
20.000	19.885	56.5760	96.3400	204.59
21.000	20.877	48.0240	80.2100	208.57
22.000	21.868	40.8860	67.1400	212.13
23.000	22.858	34.8960	56.5400	215.01
24.000	23.848	29.8460	47.7500	217.76
25.000	24.838	25.5720	40.5200	219.84
26.000	25.827	21.9430	34.4500	221.90
27.000	26.817	18.8500	29.5400	223.87
28.000	27.805	16.2260	25.0300	225.81
29.000	28.794	13.9800	21.3900	227.67
30.000	29.782	12.0619	18.2900	229.75
32.000	31.757	9.0206	13.2700	234.70
34.000	33.732	6.7861	9.7910	239.38
36.000	35.705	5.1393	7.2270	245.60
38.000	37.676	3.9209	5.3720	252.07
40.000	39.647	3.0113	4.0290	258.11
42.000	41.616	2.3262	3.0540	263.93
44.000	43.584	1.8058	2.3270	268.00
46.000	45.551	1.4080	1.7870	272.04
48.000	47.517	1.1012	1.3060	274.44
50.000	49.481	.8625	1.0830	274.96
52.000	51.444	.6752	.8543	272.94
54.000	53.406	.5275	.6753	269.73
56.000	55.367	.4108	.5328	265.25
58.000	57.326	.3188	.4203	261.94
60.000	59.284	.2465	.3302	257.72
62.000	61.241	.1900	.2566	255.65
64.000	63.197	.1461	.1992	253.19
66.000	65.152	.1121	.1538	251.81
68.000	67.105	.0860	.1183	251.09
70.000	69.057	.0661	.0893	255.53

TABLE IV. 3 HYDROSTATIC MODEL ATMOSPHERE, **MARCH**

STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	GEO. HT. KM	P MB	D G/M3	TV DEG K
.000	.000	1011.0000	1154.0000	305.19
.002	.002	1010.8000	1154.0000	305.17
1.000	.997	902.5200	1065.0000	295.21
2.000	1.994	803.3500	965.0000	290.01
3.000	2.991	713.6700	871.6000	285.23
4.000	3.987	632.6400	788.1000	279.65
5.000	4.983	559.4700	711.2000	274.05
6.000	5.979	493.5300	640.5000	268.44
7.000	6.974	434.1800	576.4000	262.40
8.000	7.969	380.8200	518.1000	256.07
9.000	8.964	332.8800	465.6000	[illegible]
10.000	9.959	289.8200	418.2000	241.45
11.000	10.953	251.1800	375.1000	233.28
12.000	11.947	216.5800	335.5000	224.87
13.000	12.940	185.7200	298.6000	216.69
14.000	13.933	158.3300	264.4000	208.63
15.000	14.926	134.1700	232.3000	201.20
16.000	15.919	113.0700	201.9000	195.04
17.000	16.911	94.8780	172.6000	191.54
18.000	17.903	79.5560	143.4000	193.26
19.000	18.895	66.9590	116.8000	199.78
20.000	19.886	56.6450	96.2000	205.14
21.000	20.877	48.1100	80.0000	209.49
22.000	21.868	40.9880	67.0300	213.03
23.000	22.858	35.0050	56.5000	215.85
24.000	23.848	29.9550	47.8000	218.33
25.000	24.838	25.6770	40.5600	220.55
26.000	25.827	22.0450	34.4800	222.75
27.000	26.817	18.9550	29.3700	224.82
28.000	27.805	16.3220	25.0600	226.87
29.000	28.794	14.0750	21.4000	229.08
30.000	29.782	12.1551	18.3100	231.22
32.000	31.757	9.1027	13.3100	235.41
34.000	33.732	6.8559	9.8100	240.64
36.000	35.705	5.1982	7.2660	246.35
38.000	37.676	3.9705	5.3930	253.48
40.000	39.647	3.0559	4.0330	260.88
42.000	41.616	2.3674	3.0630	266.08
44.000	43.584	1.8421	2.3500	269.85
46.000	45.551	1.4377	1.8170	272.43
48.000	47.517	1.1245	1.4120	274.18
50.000	49.481	.8799	1.1100	272.89
52.000	51.444	.6875	.8742	270.75
54.000	53.406	.5361	.6887	267.96
56.000	55.367	.4168	.5422	264.68
58.000	57.326	.3232	.4253	261.66
60.000	59.284	.2500	.3327	258.67
62.000	61.241	.1927	.2601	255.00
64.000	63.197	.1480	.2027	251.28
66.000	65.152	.1134	.1554	251.25
68.000	67.105	.0869	.1198	249.87
70.000	69.057	.0655	.0920	248.97

TABLE IV. 4 HYDROSTATIC MODEL ATMOSPHERE. APRIL

STATION = 913560 KWAJALEIN MISSLE RANGE

Z KM	GEO. HT. KM	P MB	D G/M3	TV DEG K
.000	.000	1010.9000	1154.0000	305.07
.002	.002	1010.7000	1154.0000	305.05
1.000	.997	902.5400	1063.0000	295.70
2.000	1.994	803.5000	964.0000	290.36
3.000	2.991	713.8300	872.3000	285.07
4.000	3,937	632.7100	[illegible]9.2000	279.30
5.000	4 983	559.4400	712.3000	273.61
6.000	5.979	493.4000	641.3000	268.02
7.000	6.974	433.9800	577.2000	261.94
8.000	7.969	380.6500	518.6000	255.62
9.000	8.964	332.5700	465.8000	248.72
10.000	9.959	289.4900	418.4000	241.02
11.000	10.953	250.8300	375.3000	232.86
12.000	11.947	216.2200	335.5000	224.48
13.000	12.940	185.3500	298.7000	216.16
14.000	13.933	157.9500	264.4000	208.13
15.000	14.926	133.8200	231.9000	201.01
16.000	15.919	112.7800	200.9000	195.53
17.000	16.911	94.7010	171.4000	192.50
18.000	17.903	79.4810	142.5000	194.34
19.000	18.895	66.9540	116.2000	200.71
20.000	19.886	56.6920	95.6900	206.39
21.000	20.877	48.1940	79.7200	210.60
22.000	21.868	41.0890	66.9500	213.81
23.000	22.858	35.1100	56.4990	216.53
24.000	23.848	30.0600	47.8000	219.07
25.000	24.838	25.7820	40.5500	221.50
26.000	25.827	22.1520	34.4600	223.95
27.000	[illegible]	[illegible]	[illegible]	[illegible]
28.000	27.805	16.4310	25.0800	228.21
29.000	28.794	14.1800	21.4700	230.11
30.000	29.782	12.2534	18.3900	232.16
32.000	31.757	9.1873	13.3900	236.41
34.000	33.732	6.9277	9.8820	241.59
36.000	35.705	5.2603	7.3090	248.01
38.000	37.676	4.0263	5.4250	255.74
40.000	39.647	3.1036	4.0880	261.63
42.000	41.616	2.4054	3.1130	266.25
44.000	43.584	1.8710	2.3970	268.98
46.000	45.551	1.4583	1.8570	270.61
48.000	47.517	1.1383	1.4450	271.54
50.000	49.481	.8891	1.1300	271.22
52.000	51.444	.6937	.8874	269.38
54.000	53.406	.5404	.6963	267.42
56.000	55.367	.4201	.5473	264.49
58.000	57.326	.3255	.4312	260.12
60.000	59.284	.2511	.3391	255.10
62.000	61.241	.1922	.2700	245.26
64.000	63.197	.1459	.2096	239.90
66.000	65.152	.1102	.1611	235.59
68.000	67.105	.0830	.1214	235.60
70.000	69.057	.0631	.0866	251.16

TABLE IV. 5 HYDROSTATIC MODEL ATMOSPHERE, MAY

STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	GEO. HT. KM	P MB	D G/M3	TV DEG K
.000	.000	1010.6000	1154.0000	305.20
.002	.002	1010.6000	1154.0000	305.19
1.000	.997	902.5000	1062.0000	296.14
2.000	1.994	803.5900	963.0000	290.70
3.000	2.991	713.9700	872.0000	285.24
4.000	3.987	632.8700	789.4000	279.29
5.000	4.983	559.5600	712.7000	273.52
6.000	5.979	493.4800	641.9000	267.81
7.000	6.974	434.0000	577.5000	261.78
8.000	7.969	380.5400	519.0000	255.43
9.000	8.964	332.5100	466.4000	248.39
10.000	9.959	289.3900	418.8000	240.73
11.000	10.953	250.7100	375.4000	232.66
12.000	11.947	216.0900	335.5000	224.34
13.000	12.940	185.2200	298.6000	216.08
14.000	13.933	157.8400	264.2000	208.10
15.000	14.926	133.7200	231.7000	201.06
16.000	15.919	112.7300	200.3000	196.07
17.000	16.911	94.7500	170.0000	194.12
18.000	17.903	79.6610	141.1000	196.62
19.000	18.895	67.2160	115.8000	202.24
20.000	19.886	56.9690	95.7500	207.27
21.000	20.877	46.4570	79.9600	211.13
22.000	21.868	41.3250	67.2600	214.03
23.000	22.858	35.3160	56.7800	216.67
24.000	23.848	30.2400	48.0500	219.26
25.000	24.838	25.9420	40.7300	221.90
26.000	25.827	22.2950	34.6200	224.34
27.000	26.817	19.1920	29.5100	226.58
28.000	27.805	16.5450	25.2000	228.68
29.000	28.794	14.2820	21.5700	230.68
30.000	29.782	12.3454	18.4900	232.58
32.000	31.757	9.2616	13.5500	236.92
34.000	33.732	6.9831	10.0300	240.95
36.000	35.705	5.2939	7.4560	245.80
38.000	37.676	4.0385	5.5530	251.72
40.000	39.647	3.1016	4.1540	258.45
42.000	41.616	2.3961	3.1560	262.83
44.000	43.584	1.8530	2.4110	266.94
46.000	45.551	1.4463	1.8650	268.46
48.000	47.517	1.1264	1.4500	268.85
50.000	49.481	.8772	1.1340	267.81
52.000	51.444	.6825	.8858	266.71
54.000	53.406	.5301	.6958	263.71
56.000	55.367	.4107	.5439	261.37
58.000	57.326	.3174	.4256	258.13
60.000	59.284	.2443	.3343	252.92
62.000	61.241	.1871	.2605	248.61
64.000	63.197	.1427	.2025	243.90
66.000	65.152	.1084	.1551	241.90
68.000	67.105	.0823	.1174	242.66
70.000	69.057	.0626	.0887	244.23

TABLE IV. 6 HYDROSTATIC MODEL ATMOSPHERE. JUNE

STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	GEO. HT. KM	P MB	D G/M3	TV DEG K
.000	.000	1010.9000	1154.0000	305.27
.002	.002	1010.7000	1154.0000	305.23
1.000	.997	902.6400	1062.0000	296.16
2.000	1.994	803.6900	963.7000	290.51
3.000	2.991	714.0000	872.7000	285.01
4.000	3.987	632 9400	789.9000	279.11
5.000	4.383	[illegible]	713.1000	273.31
6.000	5.979	493 3600	642.3000	267.58
7.000	6.974	433.8400	578.0000	261.49
6.000	7.969	380.3300	519.5000	255.02
9.000	8.964	332.2700	466.7000	248.02
10.000	9.959	289.1100	419.0000	240.37
11.000	10.953	250.4000	375.8000	232.13
12.000	11.947	215.7500	335.9000	223.76
13.000	12.940	184.8500	298.9000	215.45
14.000	13.933	157.4500	264.3000	207.55
15.000	14.926	133.3500	231.3000	200.81
16.000	15.919	112.4300	199.2000	196.63
17.000	16.911	94.6020	168.1000	195.00
18.000	17.903	79.7070	139.1000	199.60
19.000	18.895	67.3930	115.0000	204.14
20.000	19.886	57.1870	95.6200	208.36
21.000	20.877	48.6750	80.0760	211.79
22.000	21.868	41.5250	67.5100	214.27
23.000	22.858	35.4920	57.0300	216.81
24.000	23.848	30.3940	48.2500	219.42
25.000	24.838	26.0750	40.9500	221.82
26.000	25.827	22.4070	34.8300	224.13
27.000	26.817	[illegible]	29.6700	226.45
28.000	27.805	16.6240	25.3500	228.48
29.000	28.794	14 3490	21.6900	230.44
30.000	29.782	12.3997	18.6300	231.69
32.000	31.757	9.2893	13.6600	235.16
34.000	33.732	6.9875	10.1200	238.92
36.000	35.705	5.2872	7.4780	244.56
38.000	37.676	4.0290	5.5530	250.92
40.000	39.647	3.0883	4.1790	255.57
42.000	41.616	2.3788	3.1660	259.82
44.000	43.584	1.8410	2.4040	264.81
46.000	45.551	1.4300	1.8510	267.21
48.000	47.517	1.1128	1.4350	269.27
50.000	49.481	.8655	1.1170	268.22
52.000	51.444	.6743	.8753	266.40
54.000	53.406	.5240	.6830	265.32
56.000	55.367	.4065	.5359	262.31
58.000	57.326	.3144	.4198	259.00
60.000	59.284	.2424	.3288	254.92
62.000	61.241	.1860	.2574	249.86
64.000	63.197	.1419	.2012	243.78
66.000	65.152	.1077	.1542	[illegible]
68.000	67.105	.0918	.1169	241.83
70.000	69.057	.0623	.0866	248.66

TABLE IV. 7 HYDROSTATIC MODEL ATMOSPHERE. JULY

STATION = 913660 KHAJALEIN MISSLE RANGE

Z KM	GEO. HT. KM	P MB	D G/M3	TV DEG K
.000	.000	1010.3000	1153.0000	305.20
.002	.002	1010.0000	1153.0000	305.19
1.000	.997	902.0500	1051.0000	296.24
2.000	1.994	803.19 0	953.0000	290.55
3.000	2.991	713.5700	872.1000	285.03
4.000	3.987	632.4500	789.4000	279.10
5.000	4.983	559.1500	712.7000	273.32
6.000	5.979	493.0700	641.6000	267.62
7.000	6.974	433.6000	577.5000	261.56
8.000	7.969	380.1300	519.2000	255.07
9.000	8.964	332.0900	466.5000	247.99
10.000	9.959	288.9500	419.0000	240.26
11.000	10.953	250.2500	375.5000	232.15
12.000	11.947	215.6100	335.8900	223.67
13.000	12.940	184.7200	296.8000	215.34
14.000	13.933	157.3200	264.3000	207.32
15.000	14.926	133.2100	231.4000	200.54
16.000	15.919	112.3100	198.8000	196.84
17.000	16.911	94.5690	166.9000	197.39
18.000	17.903	79.8180	137.5000	202.28
19.000	18.895	67.6240	114.1000	206.44
20.000	19.886	57.4700	95.4100	209.84
21.000	20.877	48.9550	80.2800	212.45
22.000	21.868	41.7830	67.8100	214.64
23.000	22.858	35.7160	57.3700	216.89
24.000	23.848	30.5840	48.6100	219.19
25.000	24.838	26.2340	41.2400	221.58
26.000	25.827	22.5390	35.0900	223.77
27.000	26.817	19.3930	29.9200	225.76
28.000	27.805	16.7080	25.5700	227.66
29.000	28.794	14.4120	21.9000	229.26
30.000	29.782	12.4443	18.8000	230.58
32.000	31.757	9.3625	13.7700	233.16
34.000	33.732	6.9201	10.1800	235.65
36.000	35.705	5.2541	7.5340	241.12
38.000	37.676	3.9972	5.5520	248.00
40.000	39.647	3.0558	4.1610	253.45
42.000	41.616	2.3497	3.1350	258.61
44.000	43.594	1.8160	2.3810	263.20
46.000	45.551	1.4080	1.8340	264.97
48.000	47.517	1.0935	1.4170	266.38
50.000	49.481	.8503	1.0930	267.00
52.000	51.444	.6611	.8578	265.94
54.000	53.406	.5136	.6689	264.91
56.000	55.367	.3981	.5257	261.32
58.000	57.326	.3076	.4120	257.65
60.000	59.284	.2358	.3222	253.61
62.000	61.241	.1914	.2518	248.53
64.000	63.197	.1380	.1935	239.98
66.000	65.152	.1042	.1533	234.40
68.000	67.105	.0798	.1115	243.91
70.000	69.057	.0601	.0833	249.16

TABLE IV. 8 HYDROSTATIC MODEL ATMOSPHERE. AUGUST
STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	GEO. HT. KM	P MB	D G/M3	TV DEG K
.000	.000	1010.7000	1153.0000	305.31
.002	.002	1010.5000	1153.0000	305.30
1.000	.997	902.4300	1051.0000	296.21
2.000	1.994	803.5000	953.8000	290.43
3.000	2.991	713.8100	872.8000	284.93
4.000	3.987	632.6400	790.0000	278.99
5.000	4.983	559.2700	713.3000	273.13
6.000	5.979	493.1300	642.4000	267.42
7.000	6.974	433.6200	577.9000	261.39
8.000	7.969	380.1200	519.5000	254.92
9.000	8.964	332.0500	466.2000	247.81
10.000	9.959	288.8500	419.2000	240.06
11.000	10.953	250.1600	375.9000	231.92
12.000	11.947	215.5000	336.0000	223.45
13.000	12.940	184.6000	299.0000	215.06
14.000	13.933	157.1800	264.5000	207.02
15.000	14.926	133.0800	231.2000	200.50
16.000	15.919	112.2300	197.9000	197.59
17.000	16.911	94.5720	166.0000	198.44
18.000	17.903	79.8720	137.2000	202.77
19.000	18.895	67.6690	114.1000	205.61
20.000	19.886	57.5200	95.6600	209.47
21.000	20.877	48.9820	80.5100	211.96
22.000	21.868	41.7880	67.9500	214.20
23.000	22.858	35.7100	57.5000	216.37
24.000	23.848	30.5660	48.7300	219.54
25.000	24.838	26.2060	41.3400	220.83
26.000	25.827	22.5030	35.1600	222.94
27.000	26.817	19.3510	29.9300	225.05
28.000	27.805	16.6650	25.5800	227.00
29.000	28.794	14.3690	21.8800	228.73
30.000	29.782	12.4028	18.7900	230.09
32.000	31.757	9.2840	13.6800	232.46
34.000	33.732	6.9479	10.0800	236.59
36.000	35.705	5.2417	7.4420	241.78
38.000	37.676	3.9829	5.5000	249.56
40.000	39.647	3.0486	4.1010	255.17
42.000	41.616	2.3494	3.0870	261.27
44.000	43.584	1.8202	2.3520	265.59
46.000	45.551	1.4153	1.8090	268.51
48.000	47.517	1.1031	1.4000	275.53
50.000	49.481	.8505	1.0950	259.57
52.000	51.444	.6702	.9617	256.94
54.000	53.406	.5209	.6747	254.98
56.000	55.357	.4042	.5257	263.42
58.000	57.326	.3132	.4112	251.41
60.000	59.284	.2419	.3236	256.60
62.000	61.241	.1859	.2543	250.85
64.000	63.197	.1422	.1972	247.43
66.000	65.152	.1085	.1512	245.15
68.000	67. 05	.0828	.1143	248.64
70.000	69.057	.0634	.0959	250.52

TABLE IV. 9 HYDROSTATIC MODEL ATMOSPHERE. **SEPTEMBER**

STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	GEO. HT. KM	P MB	D G/M3	TV DEG K
.000	.000	1010.4000	1153.0000	305.40
.002	.002	1010.2000	1152.0000	305.38
1.000	.997	902.2500	1051.0000	296.37
2.000	1.994	803.3700	953.4000	290.51
3.000	2.991	713.7200	872.4000	285.00
4.000	3.987	632.5800	789.7000	279.06
5.000	4.983	559.2500	712.9000	273.28
6.000	5.975	493.1400	642.0000	267.58
7.000	6.974	433.6700	577.5000	261.59
8.000	7.969	390.2100	518.9000	255.23
9.000	8.964	332.1900	466.3000	248.18
10.000	9.959	289.0700	418.7000	240.52
11.000	10.953	250.4000	375.3000	232.42
12.000	11.947	215.7800	335.7000	223.93
13.000	12.940	184.8900	298.9000	215.50
14.000	13.933	157.4600	264.5000	207.44
15.000	14.926	133.3600	231.5000	200.69
16.000	15.959	112.4600	198.8000	197.09
17.000	16.911	94.6940	157.3000	197.21
18.000	17.903	79.8830	138.2000	201.41
19.000	18.895	67.6360	114.6000	205.57
20.000	19.885	57.4350	95.6500	208.75
21.000	20.877	48.8850	80.5800	211.33
22.000	21.868	41.6830	68.0400	213.41
23.000	22.858	35.6350	57.4400	215.95
24.000	23.849	30.4720	48.5700	218.57
25.000	24.838	26.1240	41.2200	220.78
26.000	25.827	22.4320	35.0500	222.91
27.000	26.817	19.2910	29.8500	225.06
28.000	27.805	16.6140	25.4600	227.30
29.000	28.794	14.3290	21.7800	229.21
30.000	29.782	12.3738	18.6700	230.92
32.000	31.757	9.2660	13.5100	235.73
34.000	33.732	6.9778	9.9540	239.96
36.000	35.705	5.2869	7.3920	245.80
38.000	37.676	4.0343	5.4960	252.22
40.000	39.647	3.0595	4.1170	258.70
42.000	41.616	2.3969	3.1130	264.59
44.000	43.584	1.8629	2.3610	268.82
46.000	45.551	1.4516	1.8470	270.05
48.000	47.517	1.1319	1.4420	269.82
50.000	49.481	.8828	1.1230	270.07
52.000	51.444	.6895	.8781	269.41
54.000	53.405	.5367	.6958	268.92
56.000	55.357	.4178	.5392	266.27
58.000	57.326	.3244	.4245	262.50
60.000	59.284	.2510	.3334	258.61
62.000	61.241	.1932	.2631	252.24
64.000	63.197	.1477	.2068	245.40
66.000	65.152	.1123	.1589	242.87
68.000	67.105	.0855	.1197	245.33
70.000	69.057	.0652	.0926	247.23

TABLE IV. 10 HYDROSTATIC MODEL ATMOSPHERE. OCTOBER

STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	GEO. HT. KM	P MB	D G/M3	TV DEG K
.000	.000	1010.3000	1153.0000	305.30
.002	.002	1010 1000	1153.0000	305.26
1.000	.997	902.1100	1051.0000	296.31
2.000	1.994	803.2400	953.2000	290.52
3.000	2.991	713.6200	872.1000	285.05
4.000	3.987	632.5000	789.4000	279.13
5.000	4.983	559.1900	712.7000	273.33
6.000	5.979	493.1100	641.8000	267.67
7.000	6.974	433.6600	577.3000	261.67
8.000	7.969	380.2100	518.8000	255.30
9.000	8.964	332.2100	466.1000	249.32
10.000	9.959	289.1100	418.5000	240.60
11.000	10.953	250.4300	375.4000	232.40
12.000	11.947	215.8100	335.6000	224.00
13.000	12.940	184.9400	298.7000	215.68
14.000	13.933	157.5500	264.2000	207.75
15.000	14.926	133.4500	231.4000	200.90
16.000	15.919	112.5100	199.6000	196.40
17.000	16.911	94.6330	169.7000	195.41
18.000	17.903	79.6990	139.5000	198.94
19.000	18.895	67.3500	115.1000	203.80
20.000	19.886	57.1270	95.5600	207.62
21.000	20.877	48.5890	80.3520	210.66
22.000	21.868	41.4160	57.6900	213.17
23.000	22.858	35.3710	57.1200	215.73
24.000	23.848	30.2670	48.2900	219.37
25.000	24.839	25.9490	40.9100	220.99
26.000	25.827	22.2680	34.7300	223.56
27.000	26.817	[illegible]	[illegible]	[illegible]
28.000	27.805	16.5250	25.2500	228.02
29.000	28.794	14.2590	21.6100	229.84
30.000	29.782	12.3193	18.5100	231.81
32.000	31.757	9.2391	13.5100	237.18
34.000	33.732	6.9721	9.9660	242.13
36.000	35.705	5.2965	7.3970	248.29
38.000	37.676	4.0534	5.5080	255.19
40.000	39.647	3.1210	4.1630	259.93
42.000	41.616	2.4152	3.1620	264.86
44.000	43.584	1.8758	2.4350	267.14
46.000	45.551	1.4597	1.8930	268.77
48.000	47.517	1.1392	1.4550	271.00
50.000	49.481	.8891	1.1320	272.34
52.000	51.444	.6946	.8889	270.94
54.000	53.405	.5415	.7017	267.58
56.000	55.357	.4210	.5521	264.36
58.000	57.326	.3262	.4343	260.40
60.000	59.234	.2518	.3401	256.74
62.000	61.241	.1937	.2557	252.78
64.000	63.197	.1484	.2054	249.42
66.000	65.152	.1135	.1566	249.12
68.000	67.105	.0868	.1205	249.72
70.000	69.057	.0664	.0927	248.43

TABLE IV. 11 HYDROSTATIC MODEL ATMOSPHERE, **NOVEMBER**
STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	GEO. HT. KM	P MB	D G/M3	TV DEG K
.000	.000	1010.0000	1153.0000	305.19
.002	.002	1009.7000	1153.0000	305.17
1.000	.997	901.7500	1061.0000	296.15
2.000	1.994	802.9100	962.6000	290.57
3.000	2.991	713.3500	871.3000	285.20
4.000	3.987	632.3200	788.5000	279.38
5.000	4.983	559.1000	711.8000	273.61
6.000	5.979	493.0800	641.4000	267.82
7.000	6.974	433.6500	577.2000	261.73
8.000	7.969	380.2100	518.8000	255.31
9.000	8.964	332.2100	466.1000	248.32
10.000	9.959	289.1100	418.5000	240.67
11.000	10.953	250.4600	375.2000	232.54
12.000	11.947	215.8600	335.3000	224.25
13.000	12.940	185.0200	298.3000	216.04
14.000	13.933	157.6600	263.9000	208.09
15.000	14.926	133.5700	231.5000	200.99
16.000	15.919	112.5700	200.6000	195.48
17.000	16.911	94.5250	170.9000	192.63
18.000	17.903	79.3560	141.9000	194.84
19.000	18.895	66.8880	115.6000	201.59
20.000	19.886	56.6590	95.5900	206.49
21.000	20.877	48.1550	79.9200	209.91
22.000	21.858	41.0270	67.2200	212.61
23.000	22.858	35.0280	56.6300	215.46
24.000	23.848	29.9690	47.8400	218.24
25.000	24.838	25.6950	40.4600	221.22
26.000	25.827	22.0730	34.3500	223.83
27.000	26.817	18.9960	29.2400	226.31
28.000	27.805	16.3740	24.9500	228.62
29.000	28.794	14.1360	21.3400	230.79
30.000	29.782	12.2194	18.3100	232.51
32.000	31.757	9.1633	13.4100	236.33
34.000	33.732	6.9055	9.9240	240.67
36.000	35.705	5.2366	7.3440	246.61
38.000	37.676	3.9982	5.4760	252.50
40.000	39.647	3.0686	4.1390	256.39
42.000	41.616	2.3673	3.1240	262.06
44.000	43.584	1.8343	2.3930	265.07
46.000	45.551	1.4262	1.8340	268.96
48.000	47.517	1.1117	1.4220	270.35
50.000	49.481	.8669	1.1140	269.14
52.000	51.444	.6750	.8752	255.69
54.000	53.406	.5243	.6871	263.86
56.000	55.367	.4061	.5388	260.63
58.000	57.326	.3136	.4219	257.01
60.000	59.284	.2413	.3286	253.91
62.000	61.241	.1850	.2564	249.51
34.000	63.197	.1412	.1994	244.93
66.000	65.152	.1075	.1522	244.10
68.000	67.105	.0819	.1143	247.76
70.000	69.057	.0627	.0865	250.49

TABLE IV. 12 HYDROSTATIC MODEL ATMOSPHERE, DECEMBER

STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	GEO. HT. KM	P MB	D G/M3	TV DEG K
.000	.000	1009.7000	1154.0000	304.87
.002	.002	1009.4000	1154.0000	304.85
1.000	.997	901.3500	1062.0000	295.56
2.000	1.994	802.4400	962 3000	290.48
3.000	2.991	712.9700	859.9000	285.54
4.000	3.987	632.1000	786.6000	279.93
5.000	4.983	559.0500	710.3000	274.17
6.000	5.979	493.1600	640.2000	268.35
7.000	6.974	433.8300	576.3000	262.26
8.000	7.969	380.4700	518.1000	255.81
9.000	8.964	332.5300	465.5000	248.84
10.000	9.959	289.4800	418.1000	241.22
11.000	10.953	250.8600	374.8000	233.14
12.000	11.947	216.2900	335.1000	224.85
13.000	12.940	185.4600	298.3000	216.60
14.000	13.933	158.0900	264.2000	208.44
15.000	14.926	133.9500	232.2000	200.95
16.000	15.919	112.8500	202.0000	194.63
17.000	16.911	94.6450	172.8000	190.82
18.000	17.903	79.3120	143.4000	192.64
19.000	18.895	66.7350	116.4000	199.78
20.000	19.886	56.4630	95.7300	205.48
21.000	20.877	47.9630	79.7500	209.51
22.000	21.868	40.8580	66.9100	212.74
23.000	22.858	34.8880	56.3700	215.61
24.000	23.848	29.8520	47.6300	218.34
25.000	24.838	25.5900	40.3900	220.72
26.000	25.827	21.9730	34.3400	222.91
27.000	26.817	18.8960	29.2500	225.02
28.000	27.805	16.2700	25.0200	226.55
29.000	28.794	14.0250	21.4000	228.29
30.000	29.782	12.1048	18.3200	230.18
32.000	31.757	9.0550	13.3800	234.67
34.000	33.732	6.8133	9.8520	239.74
36.000	35.705	5.1585	7.3070	244.74
38.000	37.676	3.9281	5.4580	249.48
40.000	39.647	3.0063	4.1020	254.06
42.000	41.616	2.3150	3.0780	260.74
44.000	43.584	1.7926	2.3440	265.04
46.000	45.551	1.3926	1.8050	267.24
48.000	47.517	1.0842	1.3950	269.29
50.000	49.481	.8451	1.0970	269.46
52.000	51.444	.6584	.8524	267.73
54.000	53.406	.5122	.6675	265.94
56.000	55.367	.3978	.5213	264.53
58.000	57.326	.3086	.4079	262.18
60.000	59.284	.2387	.3194	259.02
62.000	61.241	.1841	.2496	255.59
64.000	63.197	.1415	.1942	252.55
66.000	[illegible]	.1085	.1504	[illegible]
68.000	67.105	.0832	.1140	252.94
70.000	69.057	.0642	.0847	262.99

TABLE IV. 13 HYDROSTATIC MODEL ATMOSPHERE, ANNUAL
STATION = 913660 KWAJALEIN MISSLE RANGE

Z KM	GEO. HT. KM	P MB	D G/M3	TV DEG K
.000	.000	1010.4000	1154.0000	305.13
.002	.002	1010.2000	1153.0000	305.10
1.000	.997	902.1300	1062.0000	295.79
2.000	1.994	803.1500	963.5000	290.39
3.000	2.991	713.5400	871.6000	285.20
4.000	3.987	632.4900	788.6000	279.42
5.000	4.983	559.2600	711.9000	273.66
6.000	5.979	493.2400	641.3000	267.94
7.000	6.974	433.6200	577.1000	261.90
8.000	7.969	380.4000	518.7000	255.49
9.000	8.964	332.4100	466.0000	248.49
10.000	9.959	289.3100	418.5000	240.81
11.000	10.953	250.6500	375.3900	232.68
12.000	11.947	216.0400	335.6000	224.29
13.000	12.940	185.1700	298.6000	216.00
14.000	13.933	157.7800	264.3000	207.93
15.000	14.926	133.6600	231.8000	200.91
16.000	15.919	112.6600	200.4000	195.88
17.000	16.911	94.6750	170.0000	193.96
18.000	17.903	79.5380	140.9000	196.76
19.000	18.895	67.1710	115.6000	202.40
20.000	19.886	56.9280	95.8200	206.98
21.000	20.877	48.40[illegible]0	80.1100	210.49
22.000	21.868	41.2530	67.3600	213.32
23.000	22.858	35.2420	56.8500	215.95
24.000	23.848	30.1600	48.0900	218.50
25.000	24.838	25.8580	40.7800	220.89
26.000	25.827	22.2060	34.6600	223.16
27.000	26.817	19.1000	29.5300	225.36
28.000	27.805	16.4520	25.2100	227.33
29.000	28.794	14.1890	21.5700	229.21
30.000	29.782	12.2532	19.4800	231.01
32.000	31.757	9.1724	13.4800	234.95
34.000	33.732	6.9015	9.9560	239.42
36.000	35.705	5.2247	7.3680	244.91
38.000	37.676	3.9830	5.4730	251.32
40.000	39.647	3.0561	4.1050	257.08
42.000	41.616	2.3587	3.1060	262.24
44.000	43.584	1.8288	2.3720	266.28
46.000	45.551	1.4226	1.8280	268.80
48.000	47.517	1.1083	1.4160	270.42
50.000	49.481	.8653	1.1050	270.37
52.000	51.444	.6747	.8667	268.80
54.000	53.406	.5253	.6800	266.75
56.000	55.367	.4081	.5337	264.03
58.000	57.326	.3162	.4187	260.81
60.000	59.284	.2442	.3222	256.90
62.000	61.241	.1878	.2571	252.26
64.000	63.197	.1438	.2005	247.58
66.000	65.152	.1096	.1545	[illegible]
68.000	67.105	.0835	.1170	246.50
70.000	69.057	.0639	.0883	249.60

APPENDIX A

EXAMPLES OF WIND STATISTICS

Appendix A gives some examples of graphical displays of wind statistics that can be derived from the statistical parameters presented in Table I. These illustrations should aid the user of the RRA in understanding the functional relationships of the probability wind models and, thus, develop an appreciation of the powerful properties of the bivariate normal probability distribution function.

In Figure A-1 the solid straight lines for the univariate normal probability distribution function for the U - and V - wind components are plotted on normal probability graph scales using equation (7). The empirical percentile values for these wind components taken from the previously published RRA for KMR, Document 104-63 (Part I), October 1974, are illustrated by symbols. Considering the differences in the period of record and the statistical methodology, there is good agreement between these wind statistics for this example.

The conditional probability distribution function (PDF) shown in Figure A-2 is obtained by computing the conditional mean and conditional standard deviation for the V - wind component given that the U - wind component is 10.10 m/s using equations (18) and (19) and the five wind component parameters from Table I.1. The resulting conditional mean and conditional standard deviation is used in equation (7) to make the graph. In this example the conditional PDF is almost identical to the original (unconditional PDF) V - wind component because the correlation coefficient is very nearly zero.

Figures A-3-1 through A-3-6 were obtained by using the five wind component parameters from Tables I.1 and I.6 as input to the rotational equations (44) through (47) and small increments of α for $0 < \alpha \leq 360$ degrees to compute the component means and standard deviations for each α were used in equation (8) to obtain the 90th interpercentile range and plotted by an electronic computer. The locus of the component means for each α giving the circle, was similarly plotted.

Using the five wind component parameters from Tables I.1 and I.6 and $p = 0.50$, $p = 0.95$ and $p = 0.99$ as input values to equation (13), the wind probability ellipses shown in Figures A-4-1 through A-4-12 were obtained by computer graphics. The statistical inferences are, for example, that 50 percent of the wind vectors lie within the smaller ellipse and 99 percent of the wind vectors lie within the outer ellipse. These probability ellipses are illustrated using the standard meteorological coordinate system explained in Chapter I.B.1.

Using the five wind component parameters from Table I.1 in equation (30), the generalized Rayleigh probability distribution shown in Figure A-5 was derived. A comparison is made with the normal probability distribution for wind speed using the mean and standard deviation for wind speed taken from Table I.1. The empirical percentile values (plotted in symbols) for wind speed were taken from the previously published KMR, RRA, October 1974. In this example, there is closer agreement between the empirical percentile values of wind speed and the derived distribution (Rayleigh) for wind speed than with the assumption that wind speed is normally distributed.

The probability distributions of wind speed shown in Figure A-6 were derived using the five wind component parameters from Table I.1 as inputs to the Rayleigh distribution, equation (30).

Figure A-7 was obtained in a similar manner to Figure A-6 using the wind component parameters from Table I.6.

The derived frequencies for wind direction shown in Figures A-8-1 through A-8-12 were obtained using the five wind component parameters from Tables I.1 and I.6 as input values in equation (35). The limits of integration (performed numerically) are over the 22.5-degree interval for each of the 16 compass points. These graphs give the percentage frequency that the wind will blow from the direction intervals.

Figure A-9 (1-8) in cartesian form and figure A-10 (1-12)* in polar form giving the conditional percentiles of wind speed given the wind direction were derived using the five wind component statistics from Tables I.1 and I.6 as inputs to equation (41), interpolated for percentile values and illustrated by computer graphics. The conditional modes (most frequent) wind speed from the given wind directions were derived using equation (38). The conditional mean wind speeds from the given wind directions were derived using equation (40).

The locus of the conditional modal wind speed when plotted in polar form versus the given wind directions forms an ellipse. Only in the special case when the coefficient $\underline{b}$ in equation (41) is zero (i.e., when the component mean values are zero) do the loci of the conditional wind speed for fixed percentile values form a family of ellipses. The irregularities in Figure A-10-3 are caused by the lack of computational precision in evaluating equation (40) and equation (41) when the arguments for the Gaussian probability distribution function have large negative values, i.e., when the coefficients (b/a) become less than negative 4.

This appendix contains only a few of the many options in presenting wind statistics illustrations.

* Although these curves in figure A-10 (1-12) appear to be ellipses, they are not. The only curve in these figures that is an ellipse is the conditional mode.

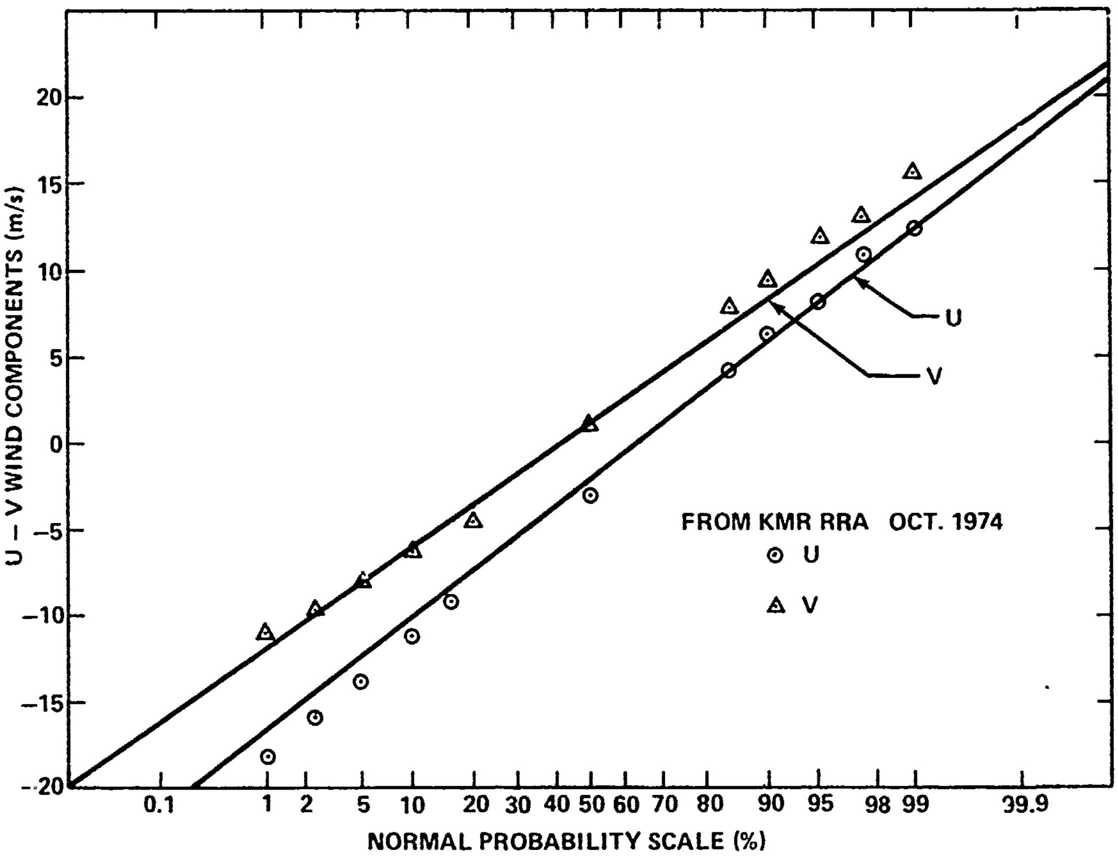


Figure A-1. Normal probability distribution of zonal (U) and meridional (V) wind component KMR, 12 km altitude, January.

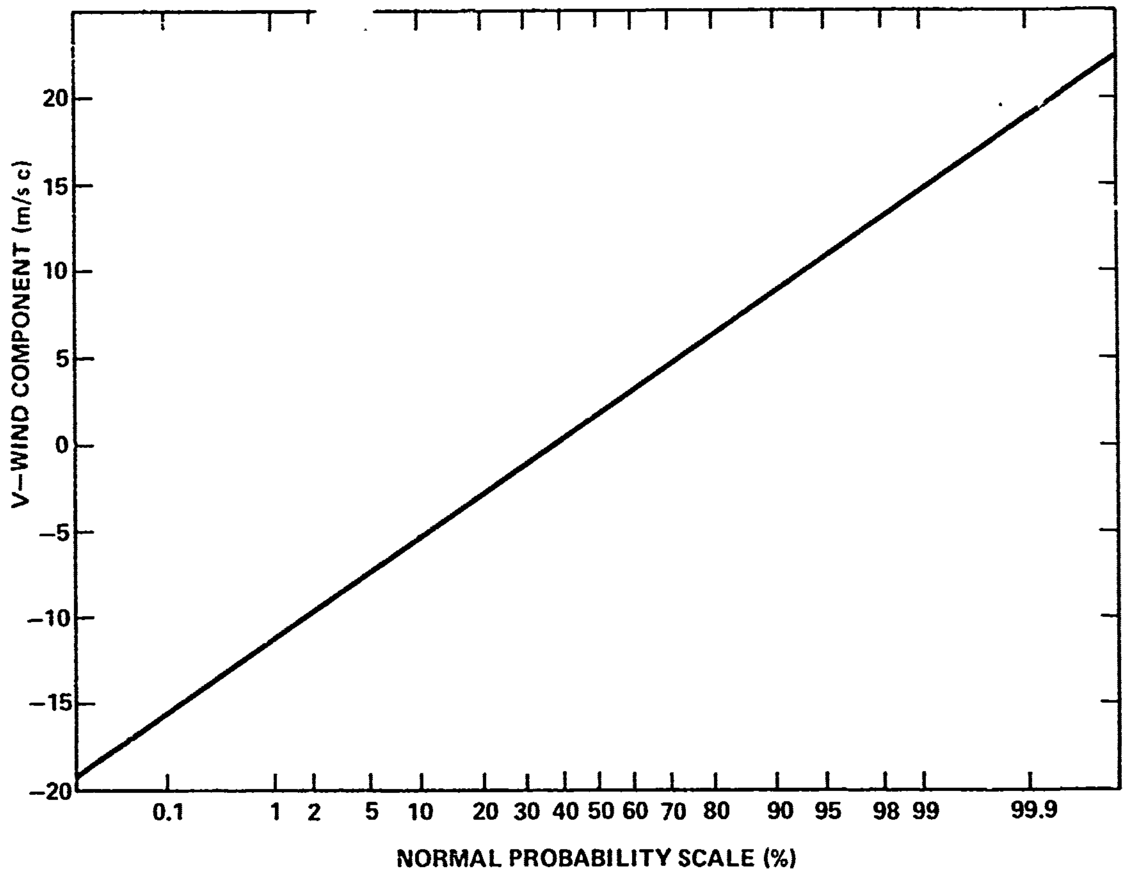


Figure A-2. Conditional distribution of meridional wind component (V) given that the zonal wind component, U = 10.10 m/s KMR, 12 km altitude, January.

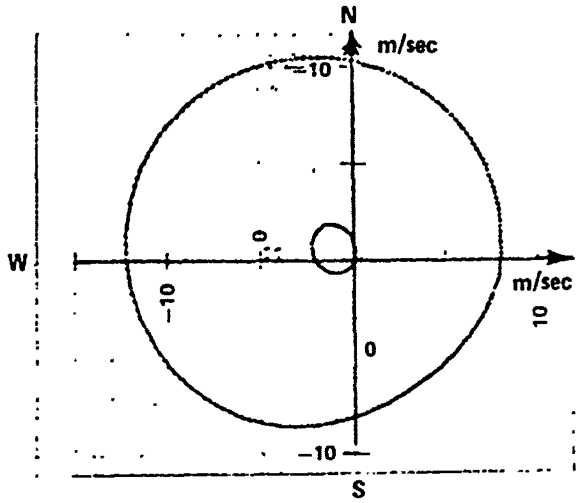


Figure A-3-1. Locus of 90th interpercentile range and locus of mean wind components w.r.t. all azimuths 0-360 degrees KMR, 12 km altitude, January.

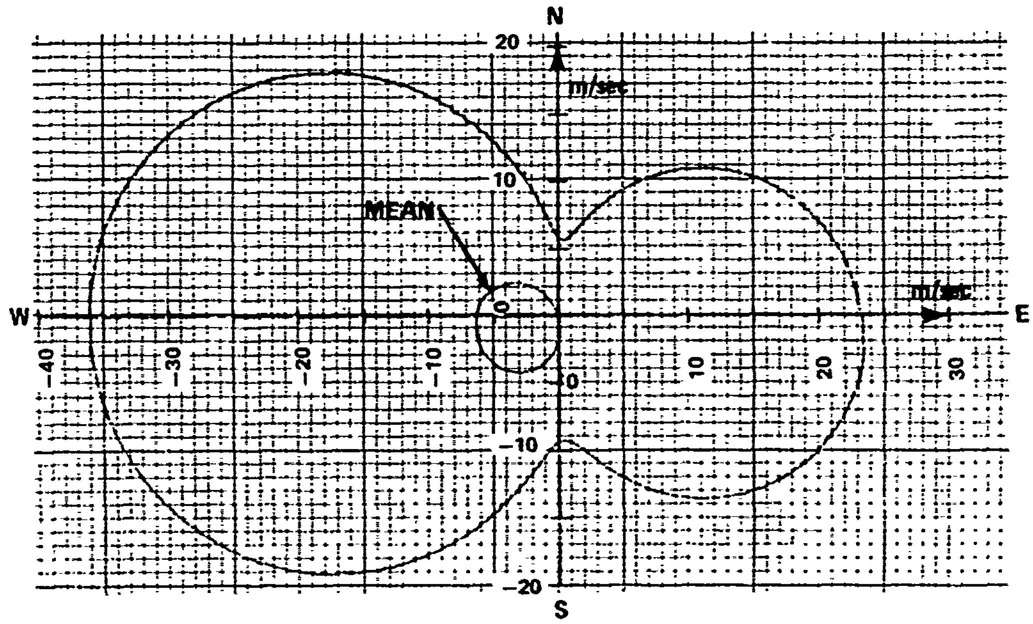


Figure A-3-2. KMR, 36 km altitude, January.

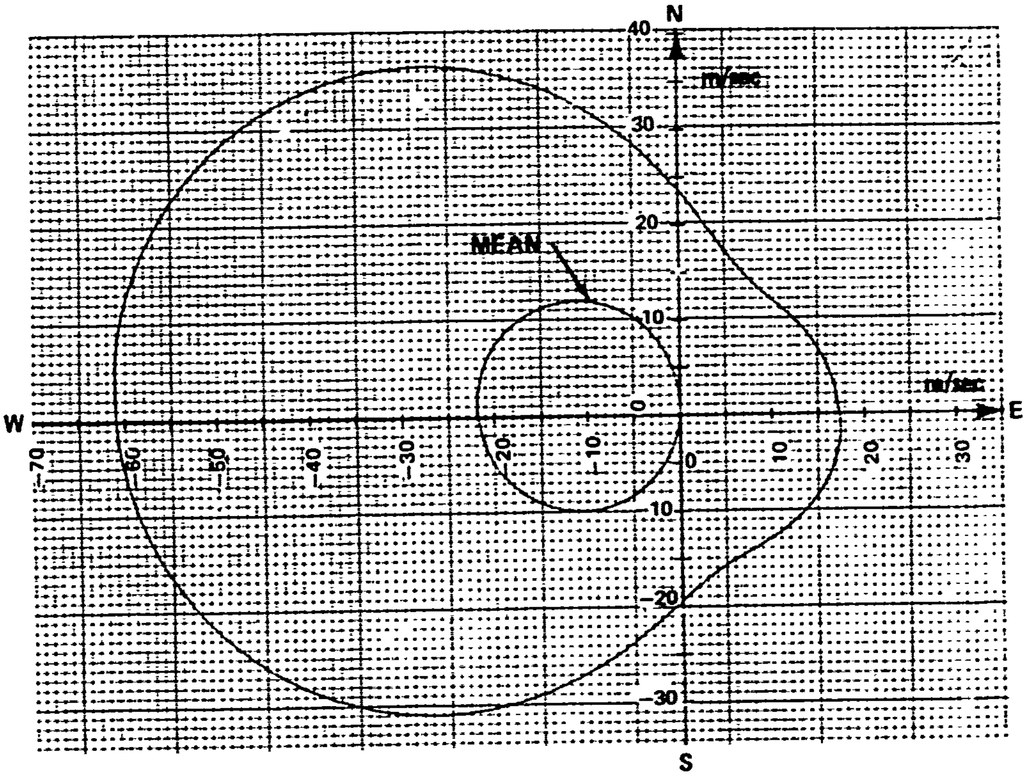


Figure A-3-3. KMR 50 km altitude, January.

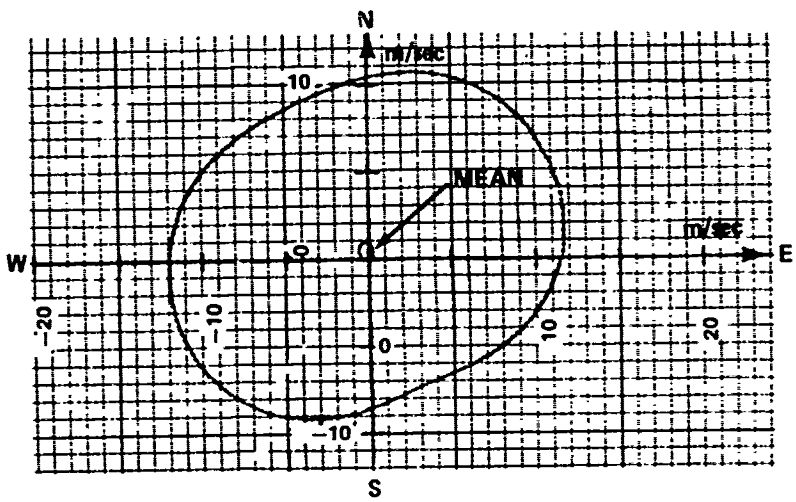


Figure A-3-4. KMR, 12 km altitude, July.

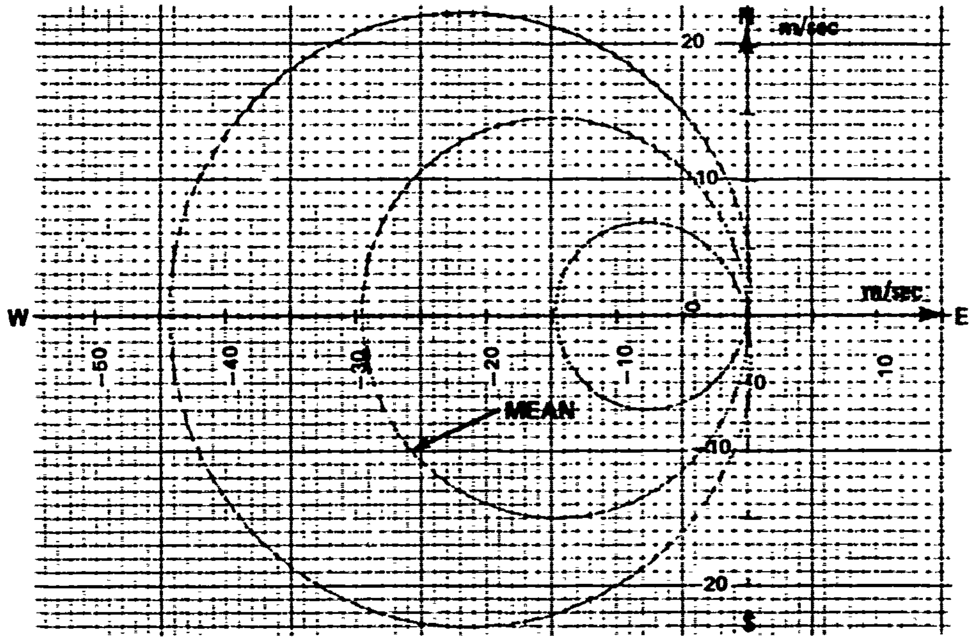


Figure A-3-5. KMR, 36 km altitude, July.

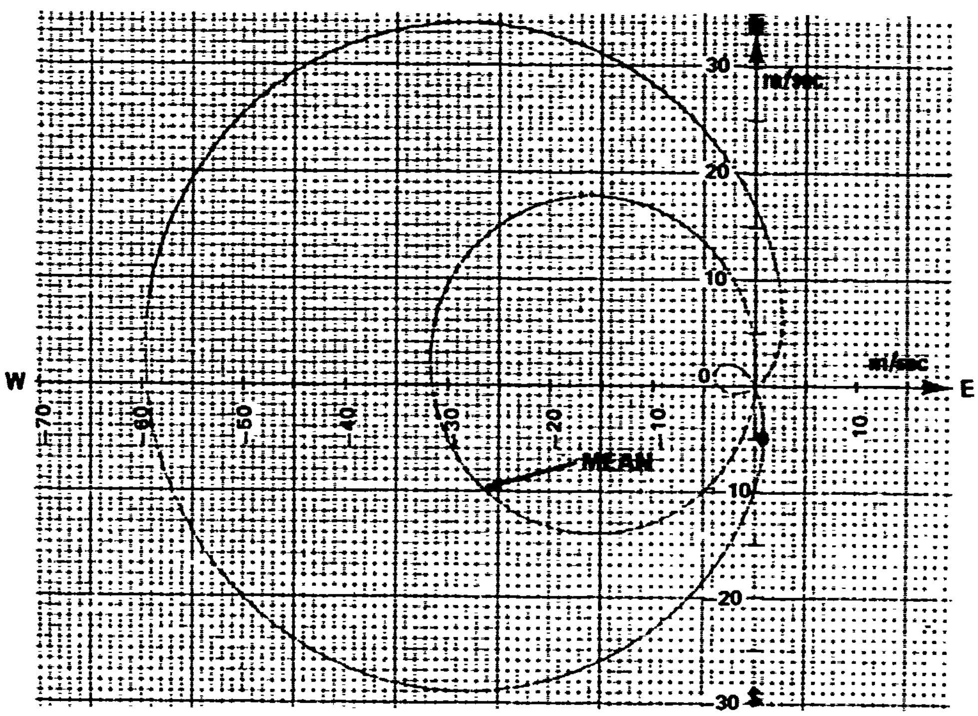


Figure A-3-6. KMR, 50 km altitude, July.

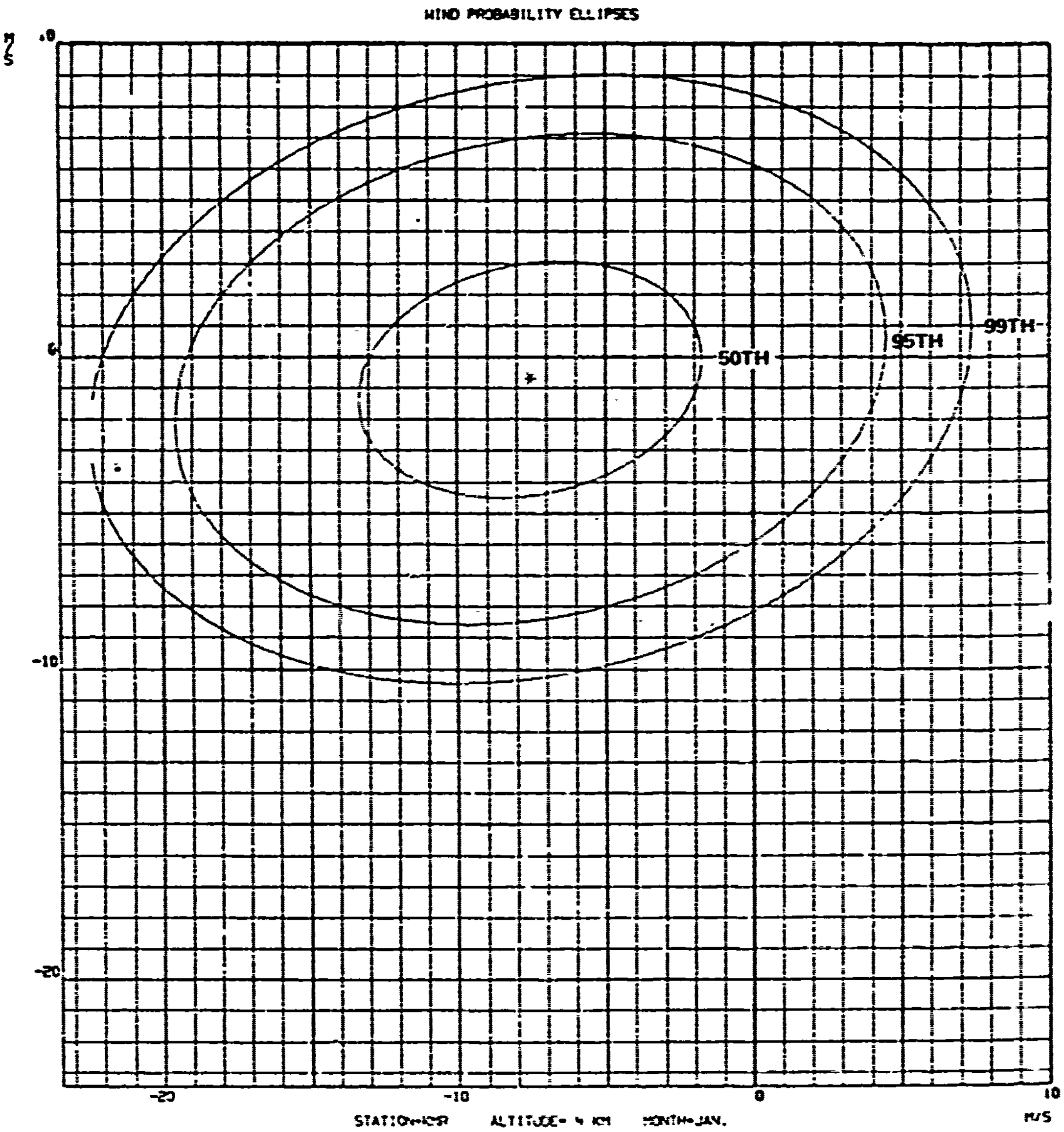


Figure A-4-1. Vector wind ellipses.

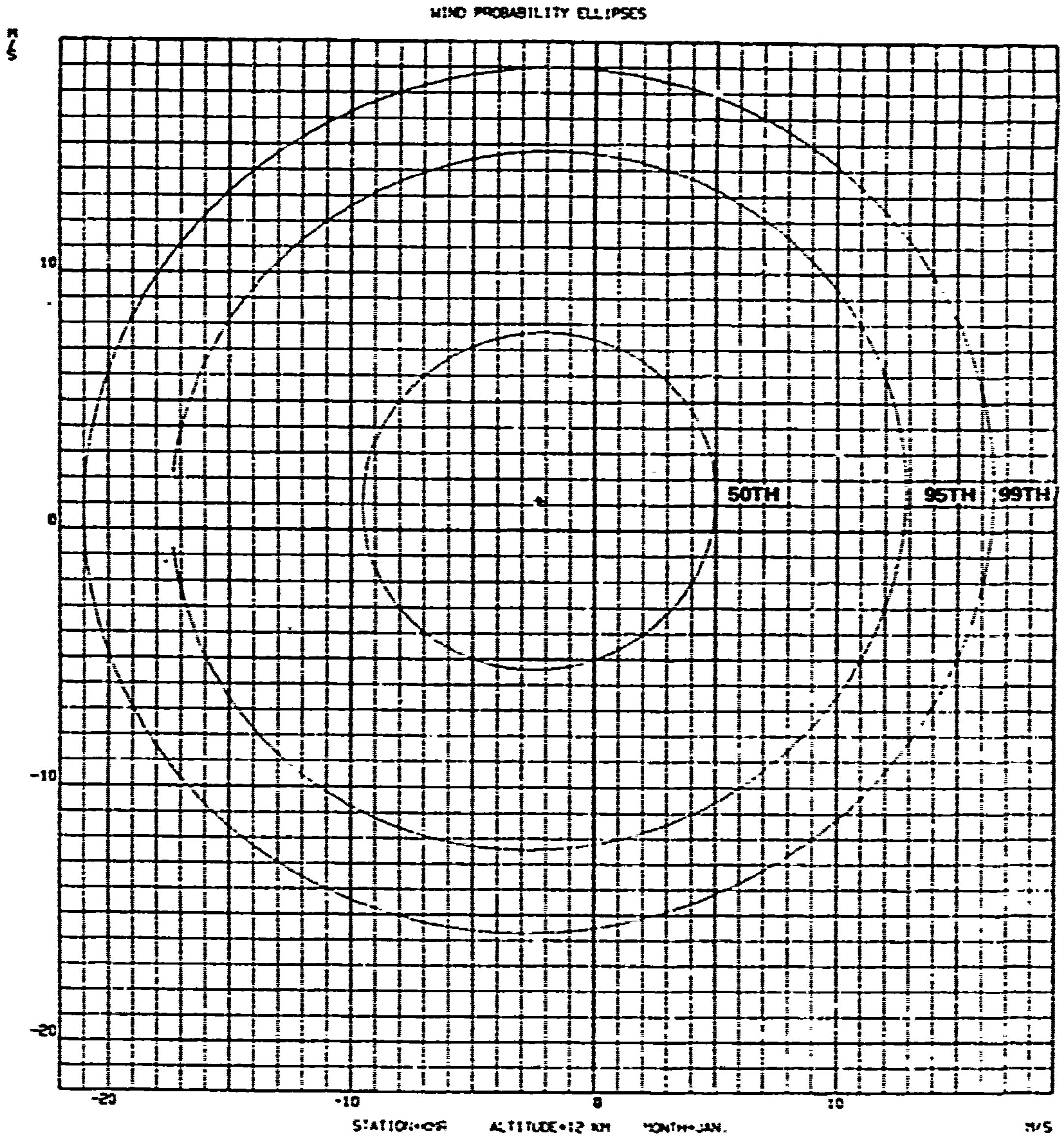


Figure A-4-2. Vector wind ellipses.

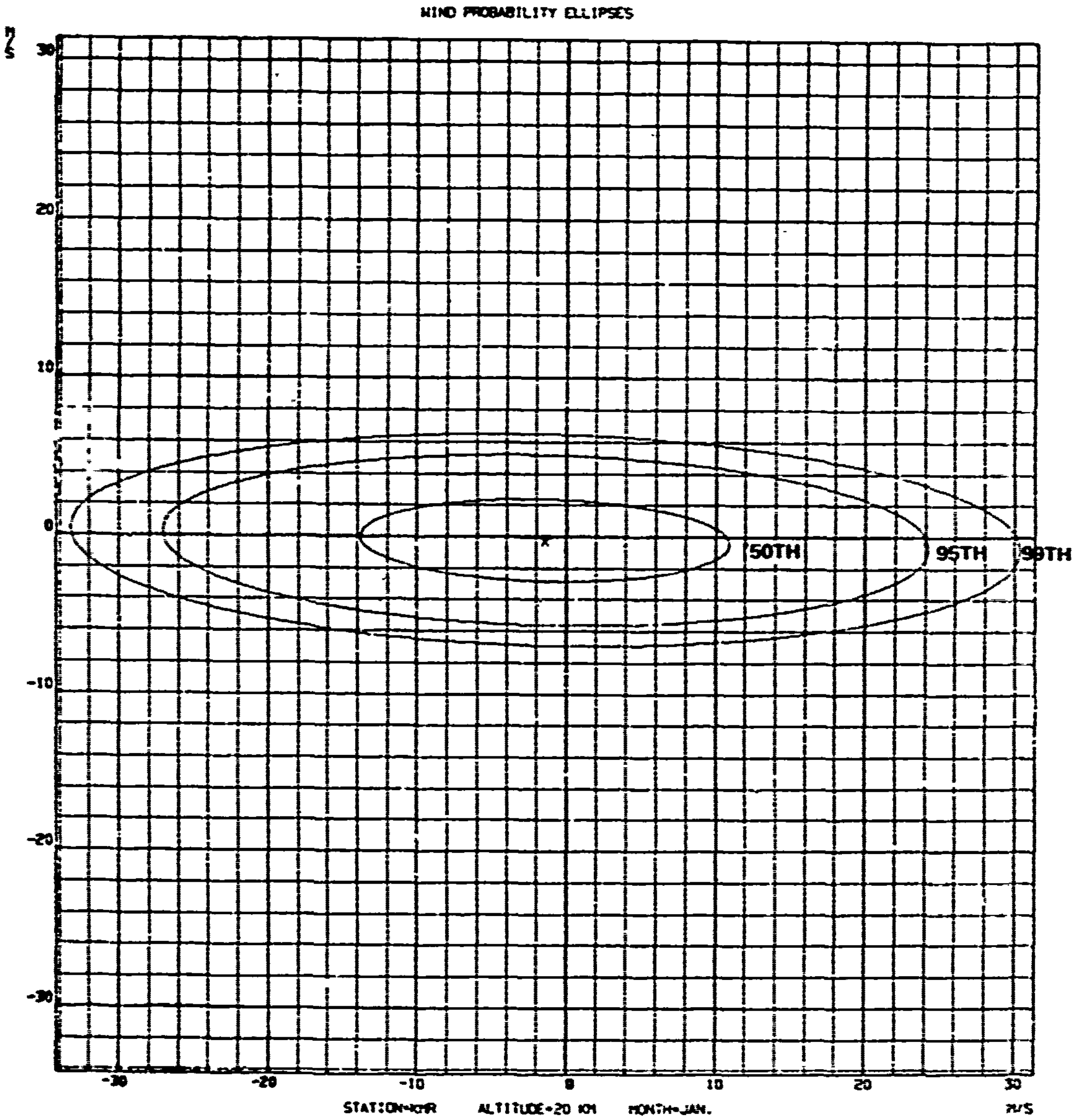


Figure A-4-3. Vector wind ellipses.

WIND PROBABILITY ELLIPSES

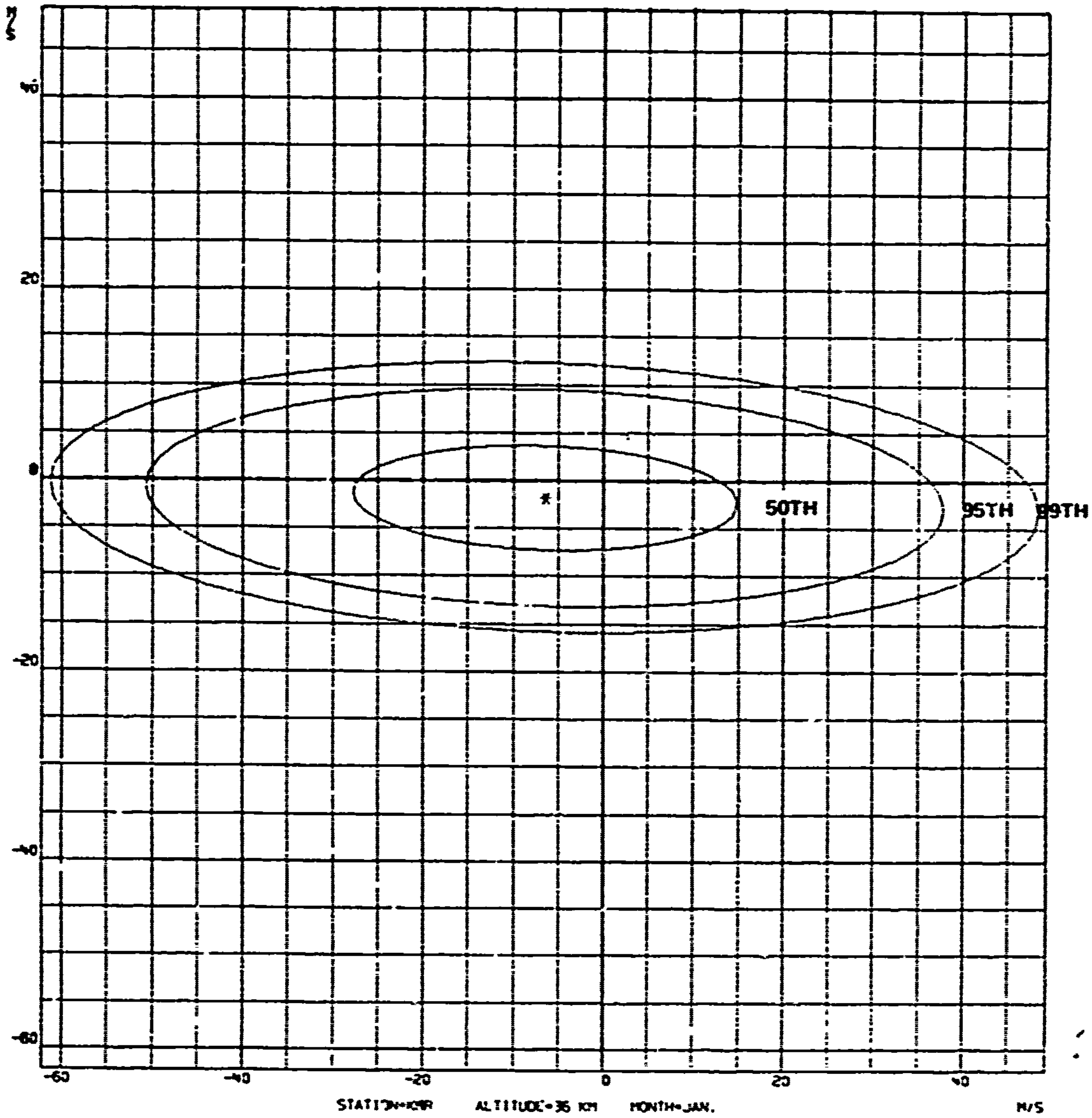


Figure A-4-4. Vector wind ellipses.

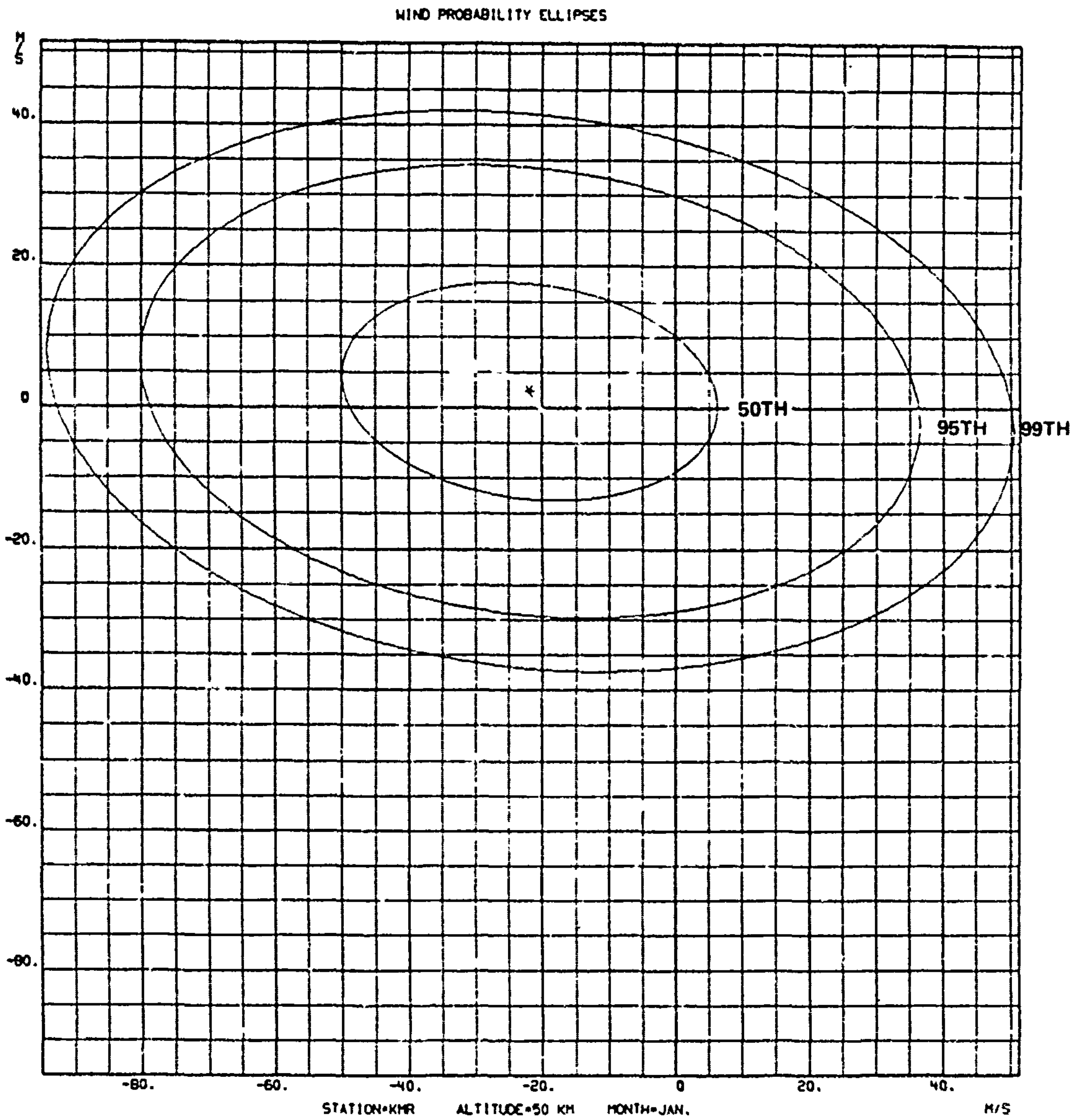


Figure A-4-5. Vector wind ellipses.

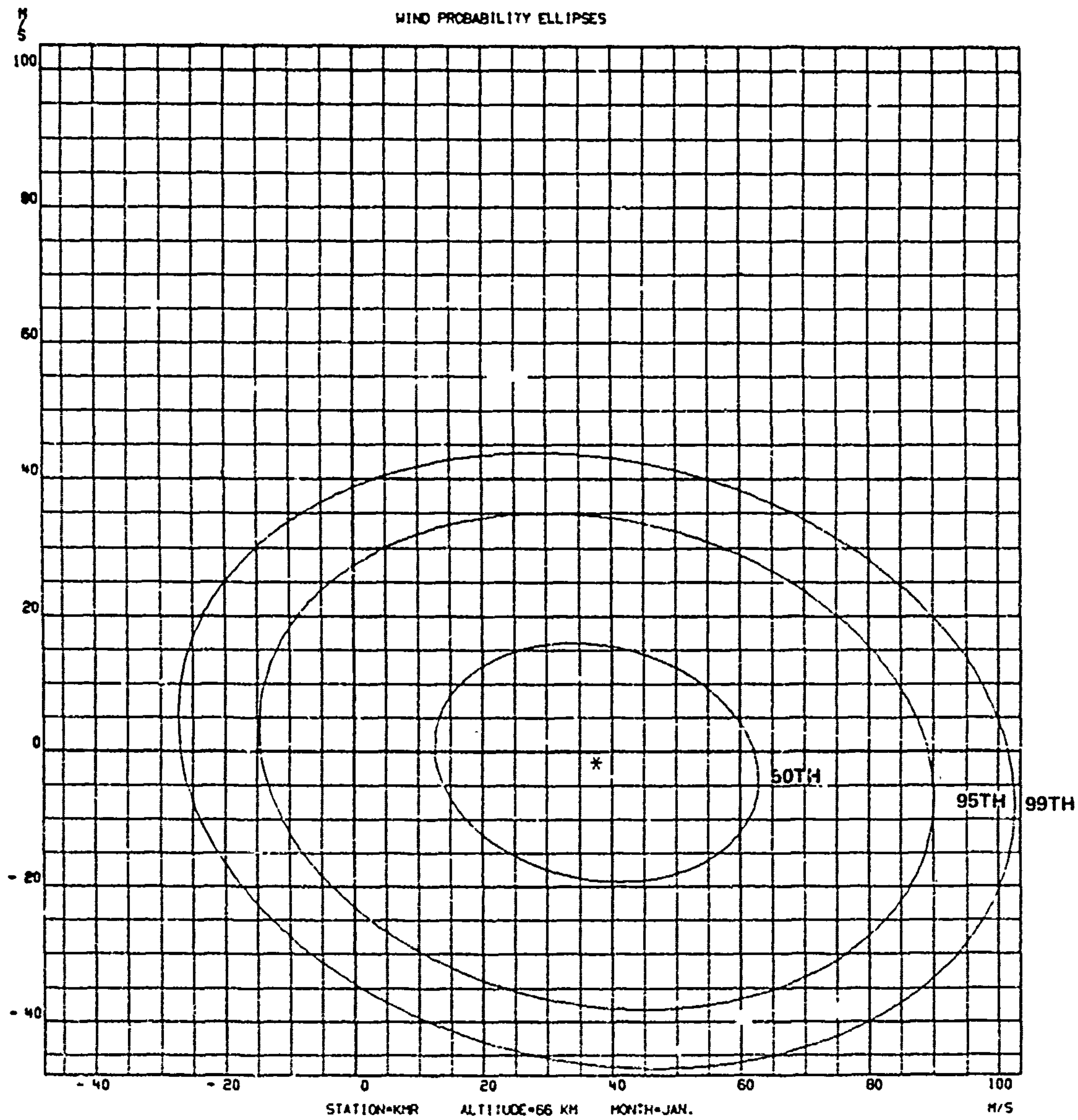


Figure A-4-6. Vector wind ellipses.

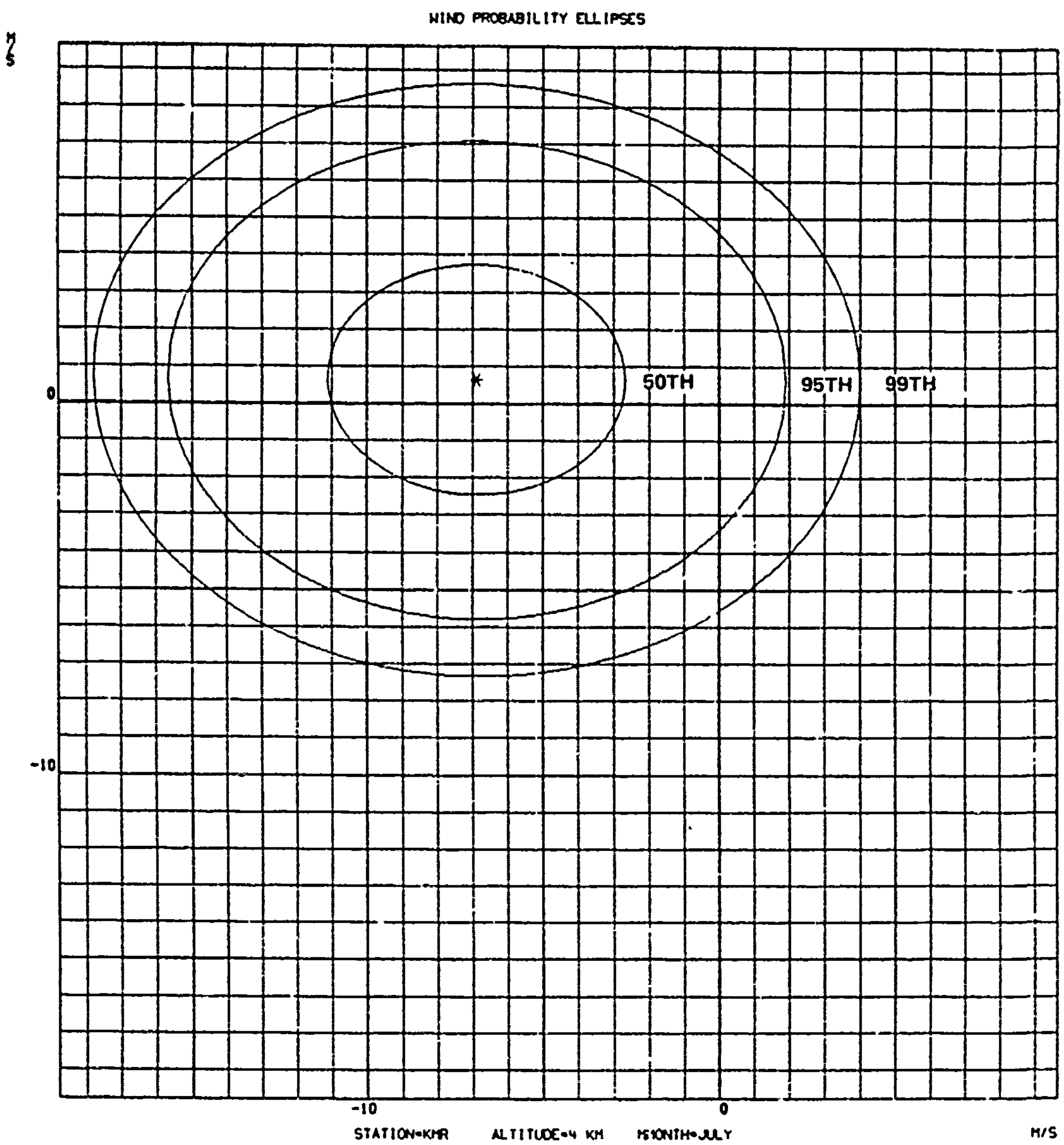


Figure A-4-7. Vector wind ellipses.

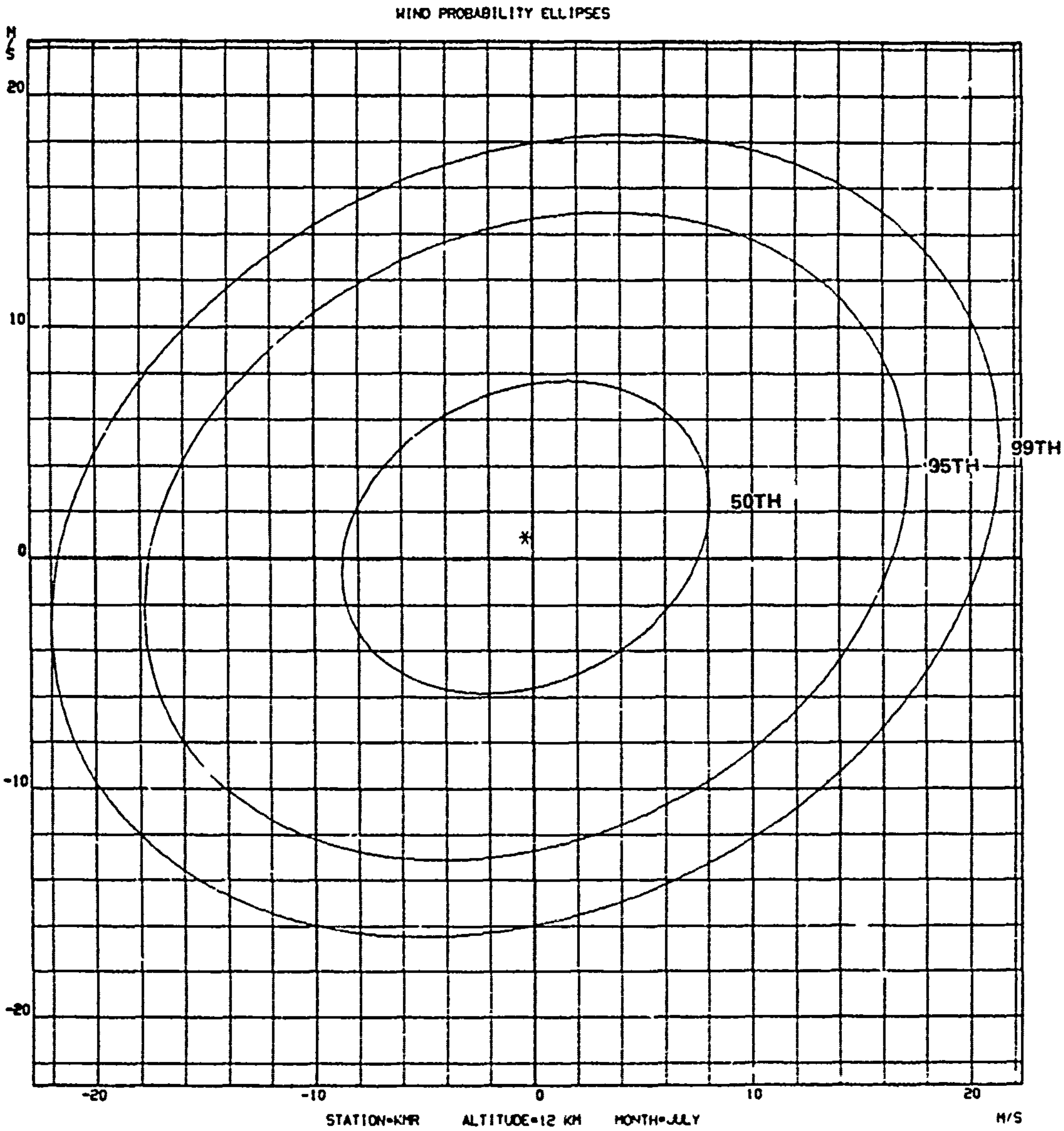


Figure A-4-8. Vector wind ellipses.

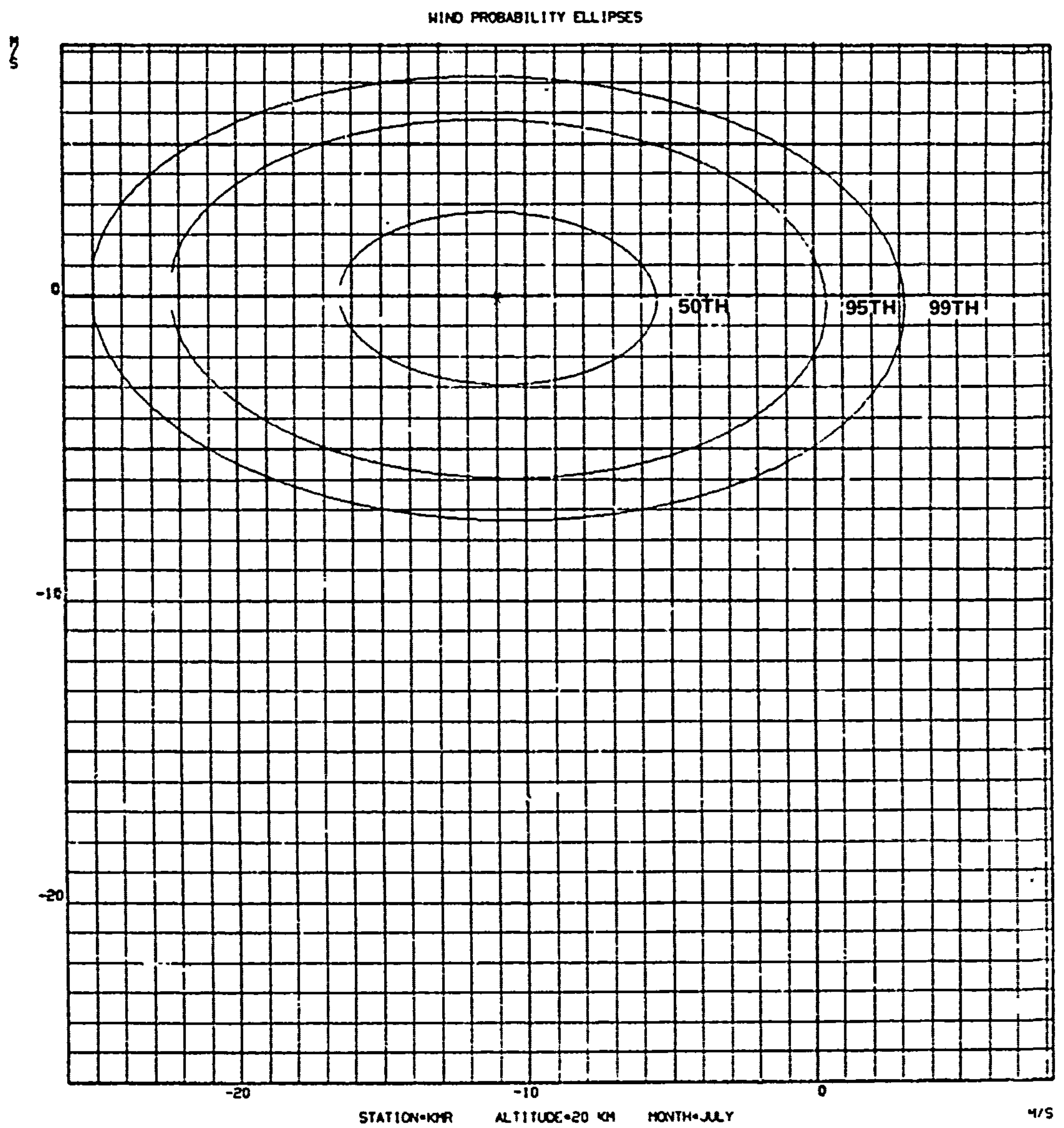


Figure A-4-9. Vector wind ellipses.

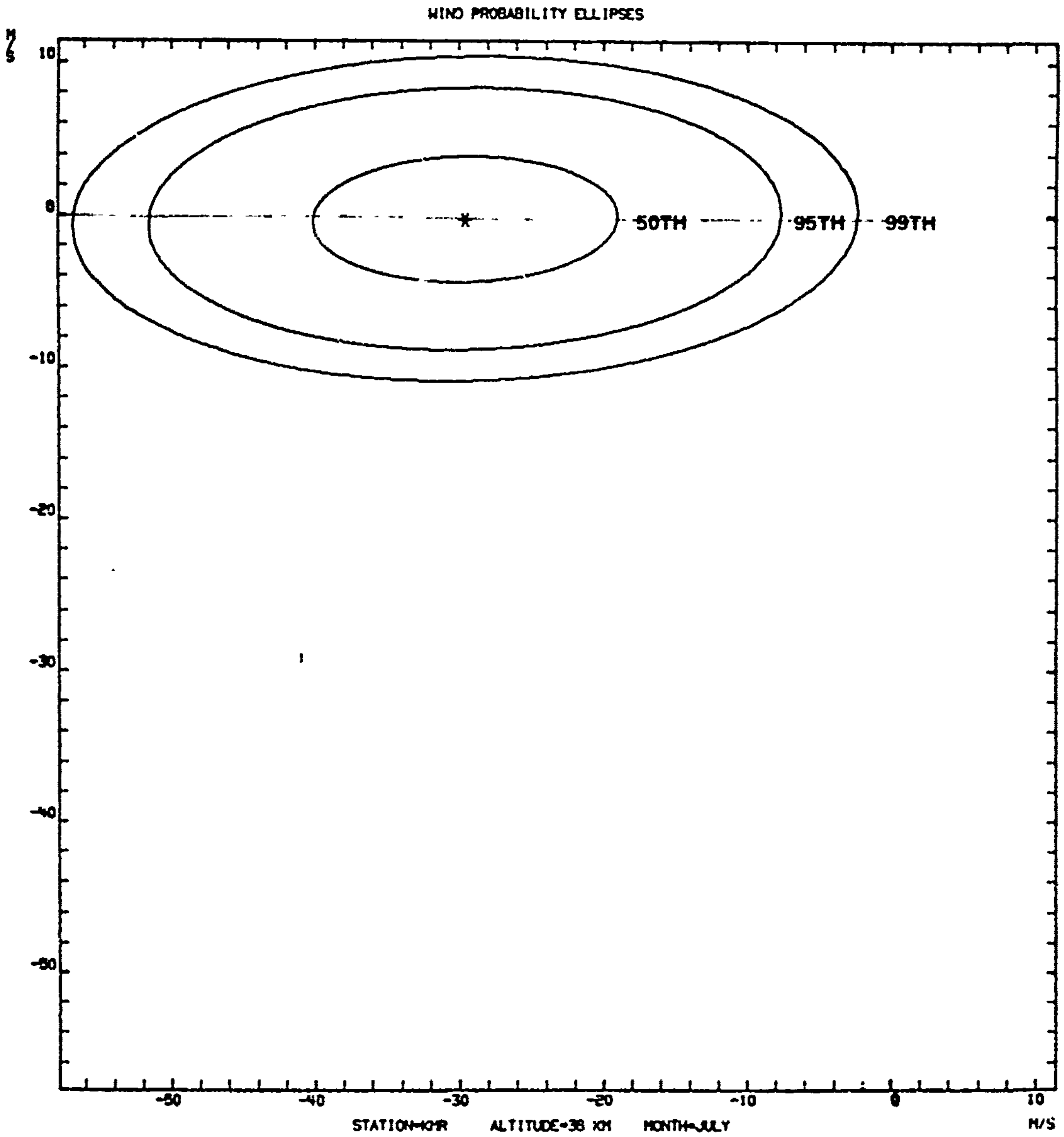


Figure A-4-10. Vector wind ellipses.

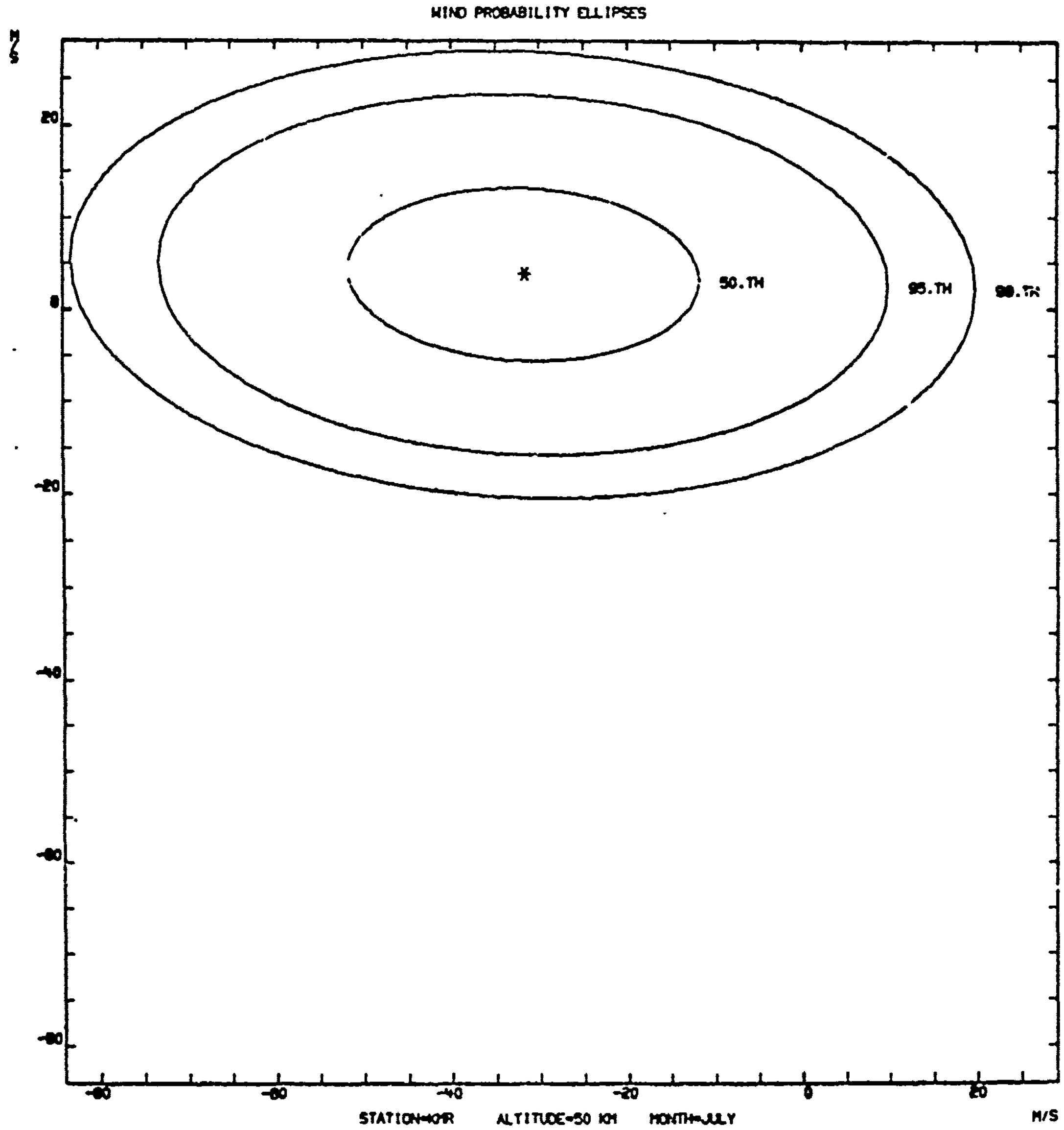


Figure A-4-11. Vector wind ellipses.

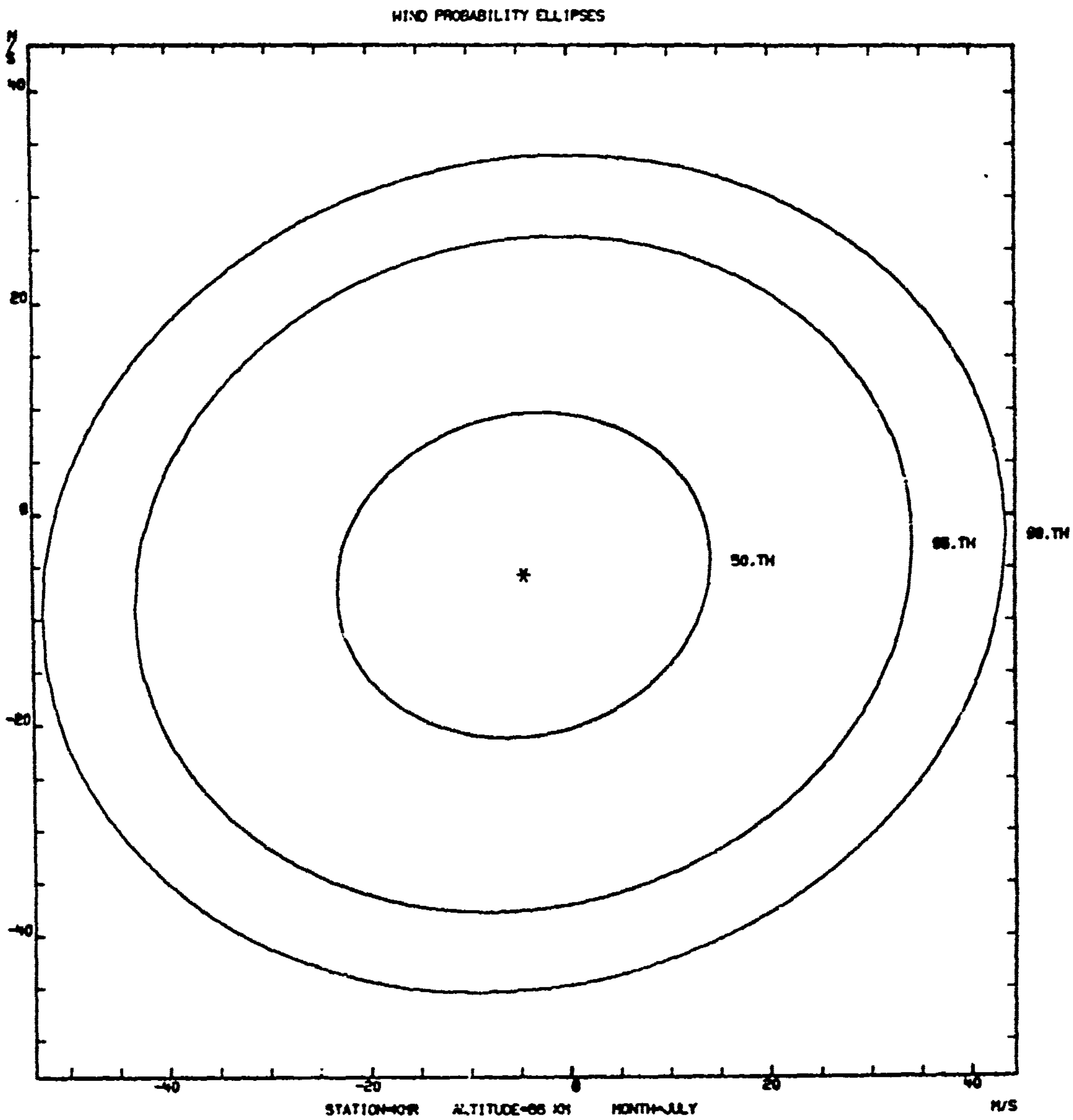


Figure A-4-12. Vector wind ellipses.

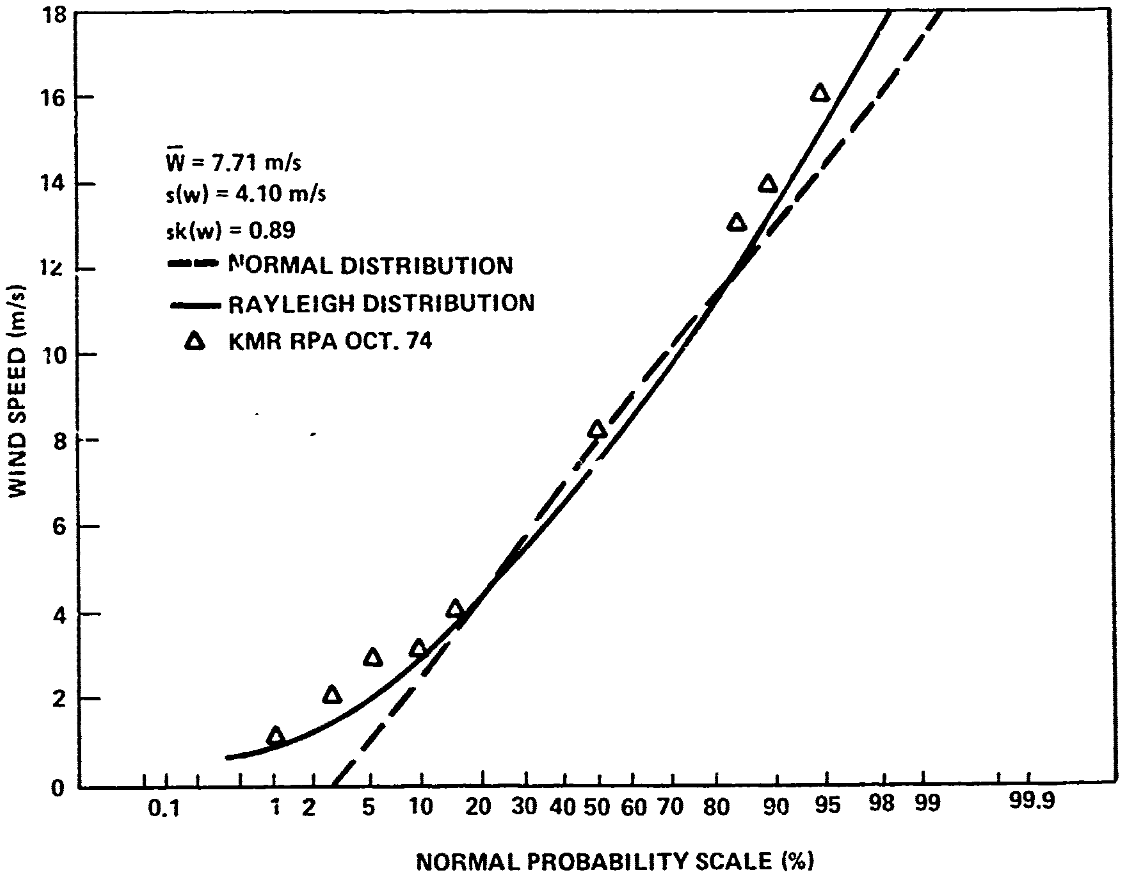


Figure A-5. Wind speed distribution KMR, 12 km altitude, January.

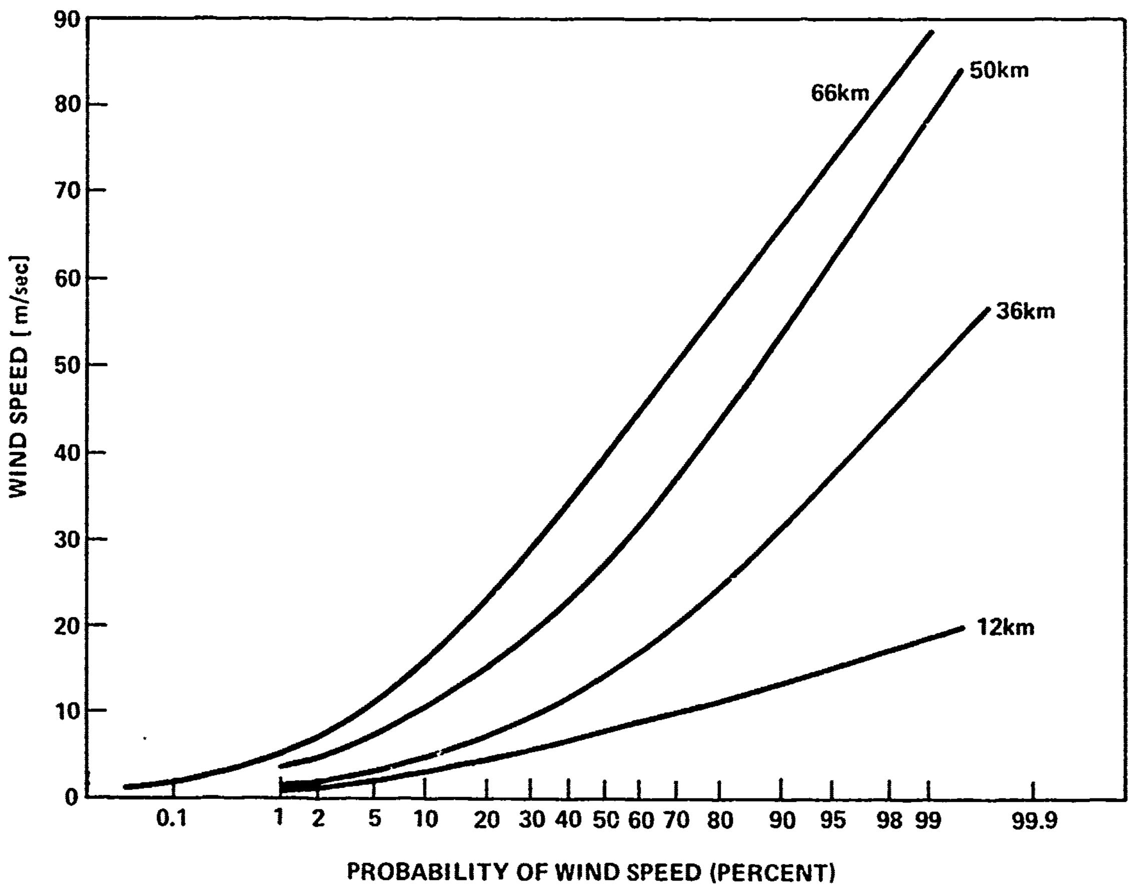


Figure A-6. Derived (Rayleigh) distributions for wind speed at 12, 36, 50 and 66 km altitude, KMR, January.

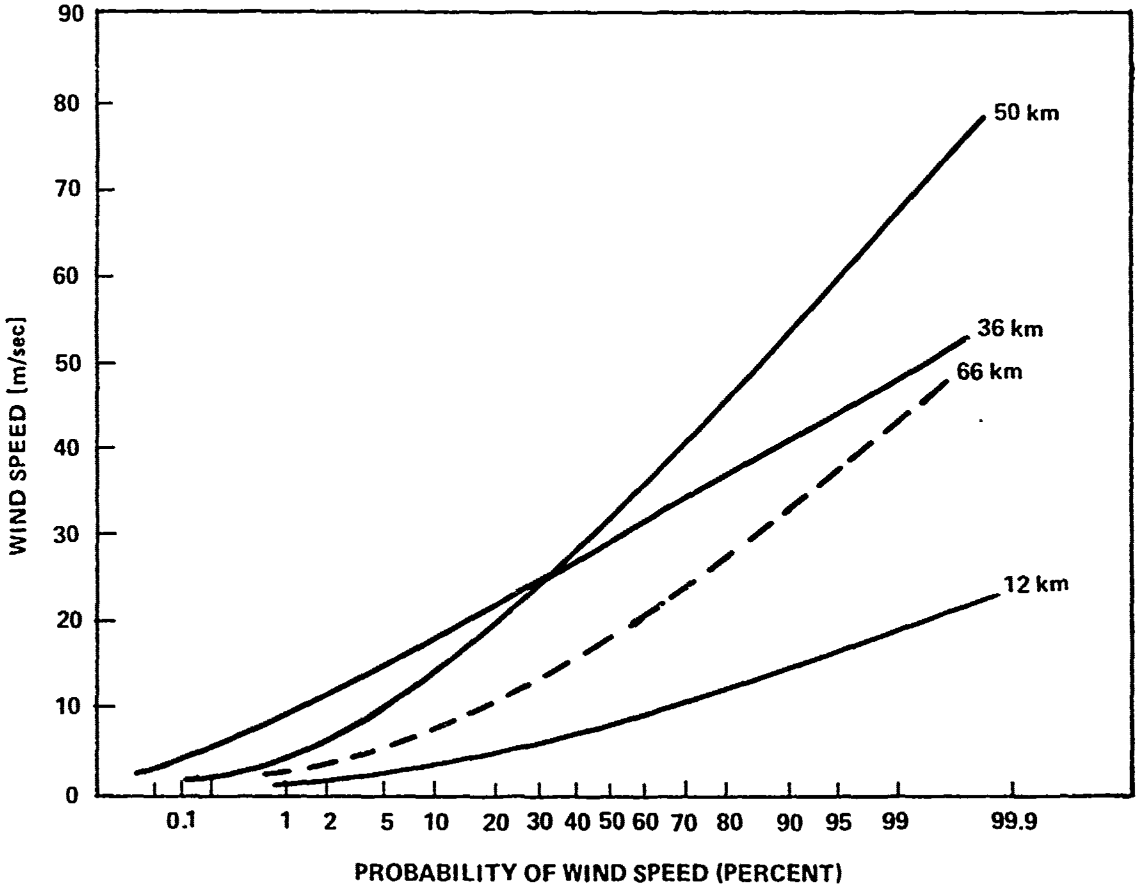


Figure A-7. Derived (Rayleigh) distributions for wind speed at 12, 36, 50, and 66 km altitude, KMR, July.

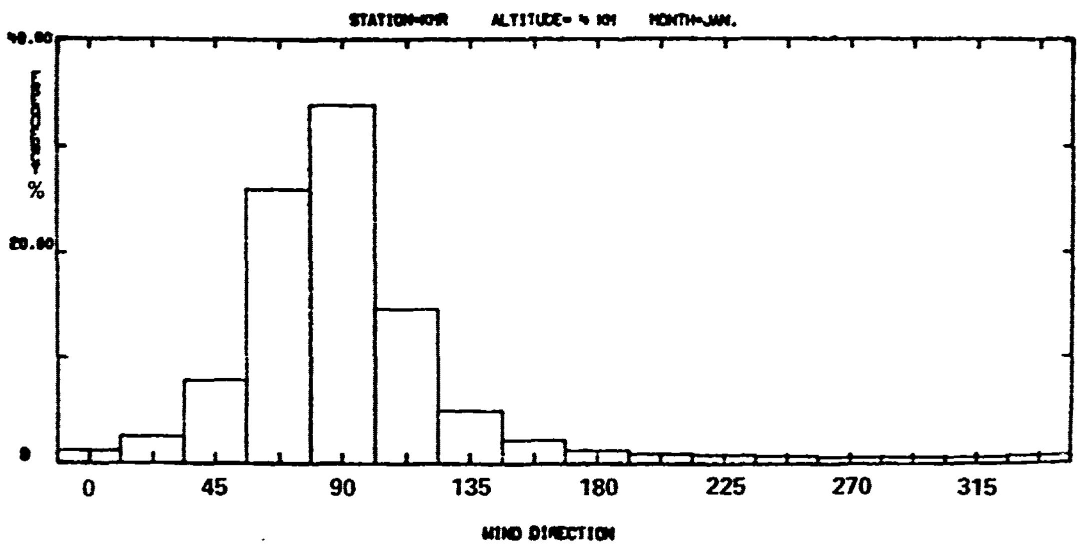


Figure A-8-1. Frequency of wind direction.

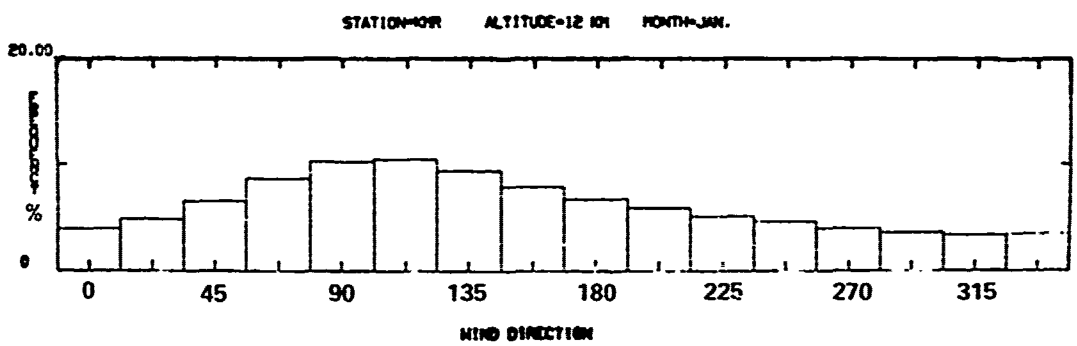


Figure A-8-2. Frequency of wind direction.

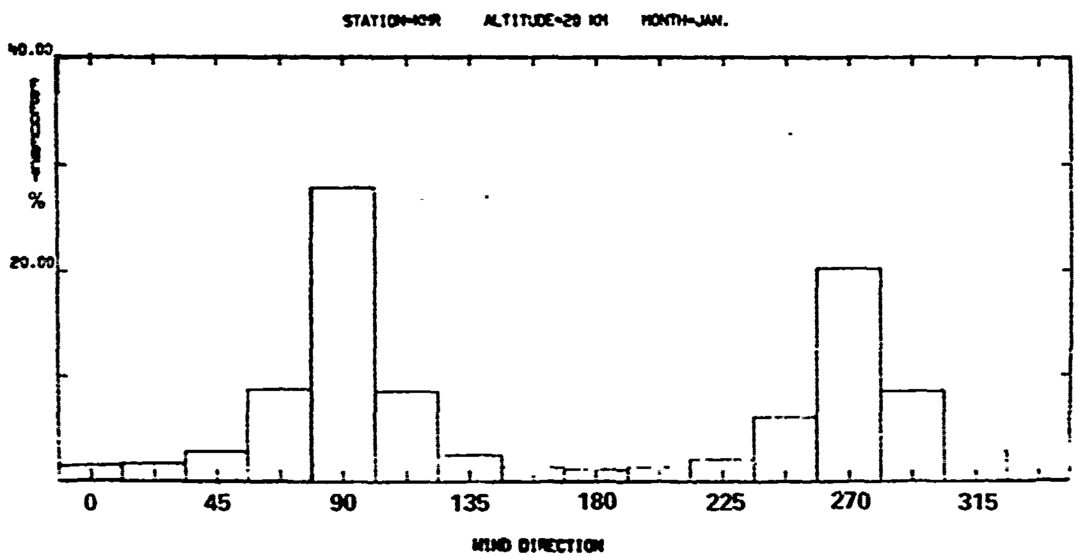


Figure A-8-3. Frequency of wind direction.

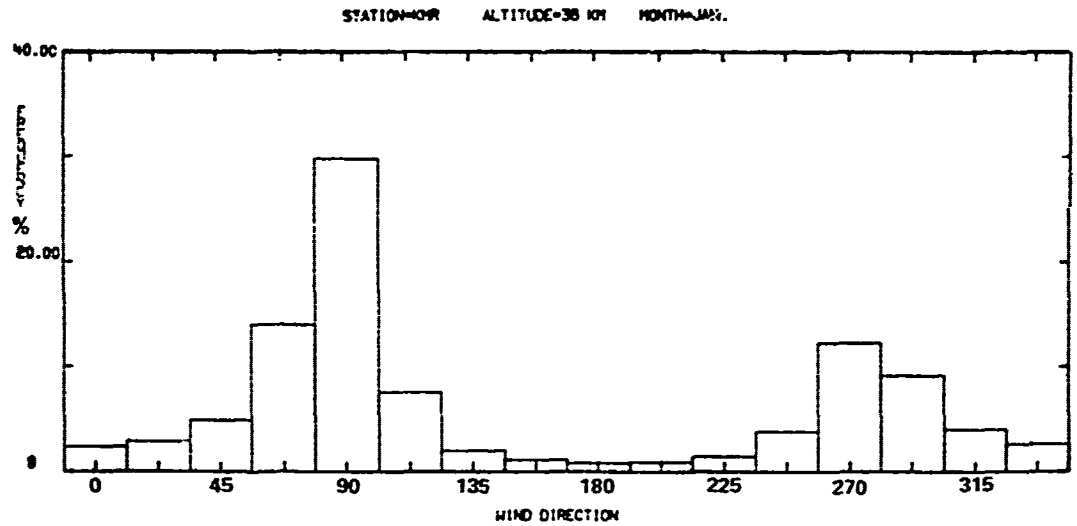


Figure A-8-4. Frequency of wind direction.

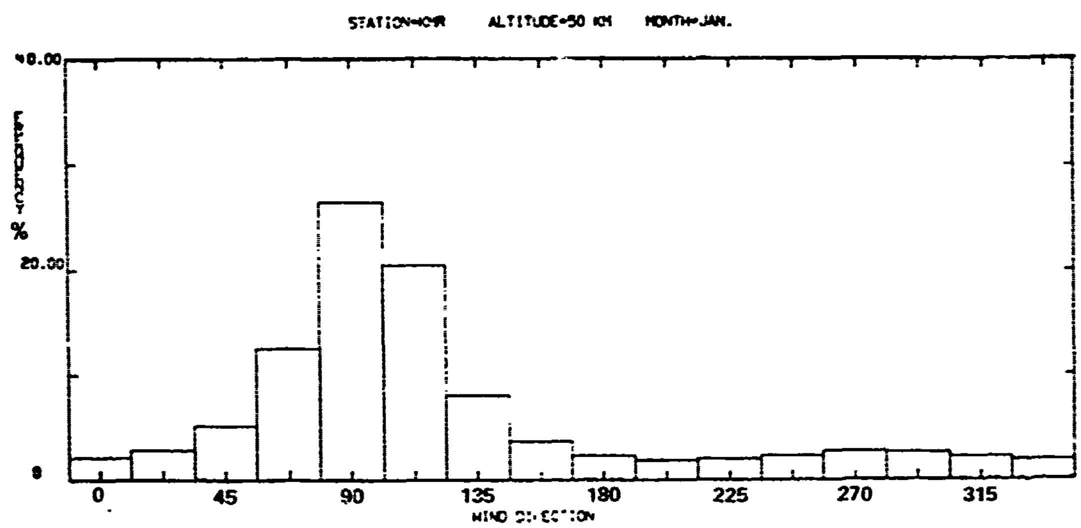


Figure A-8-5. Frequency of wind direction.

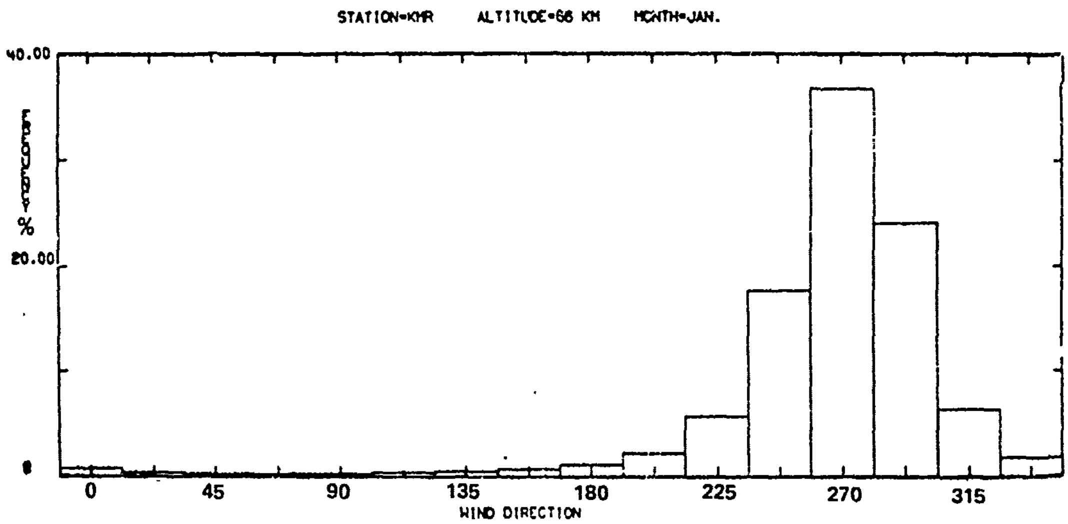


Figure A-8-6. Frequency of wind direction.

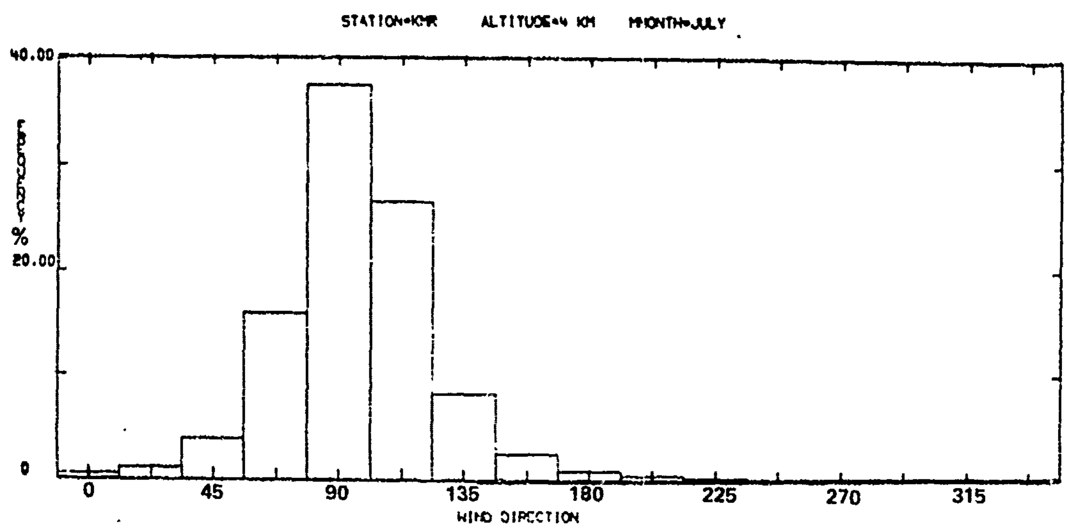


Figure A-8-7. Frequency of wind direction.

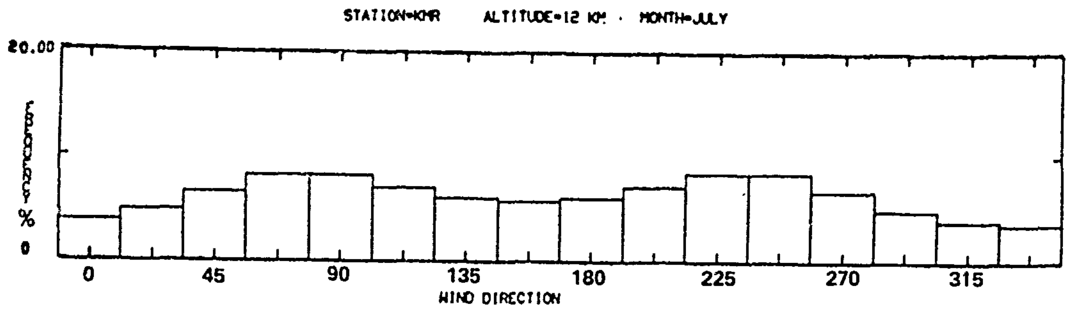


Figure A-8-8. Frequency of wind direction.

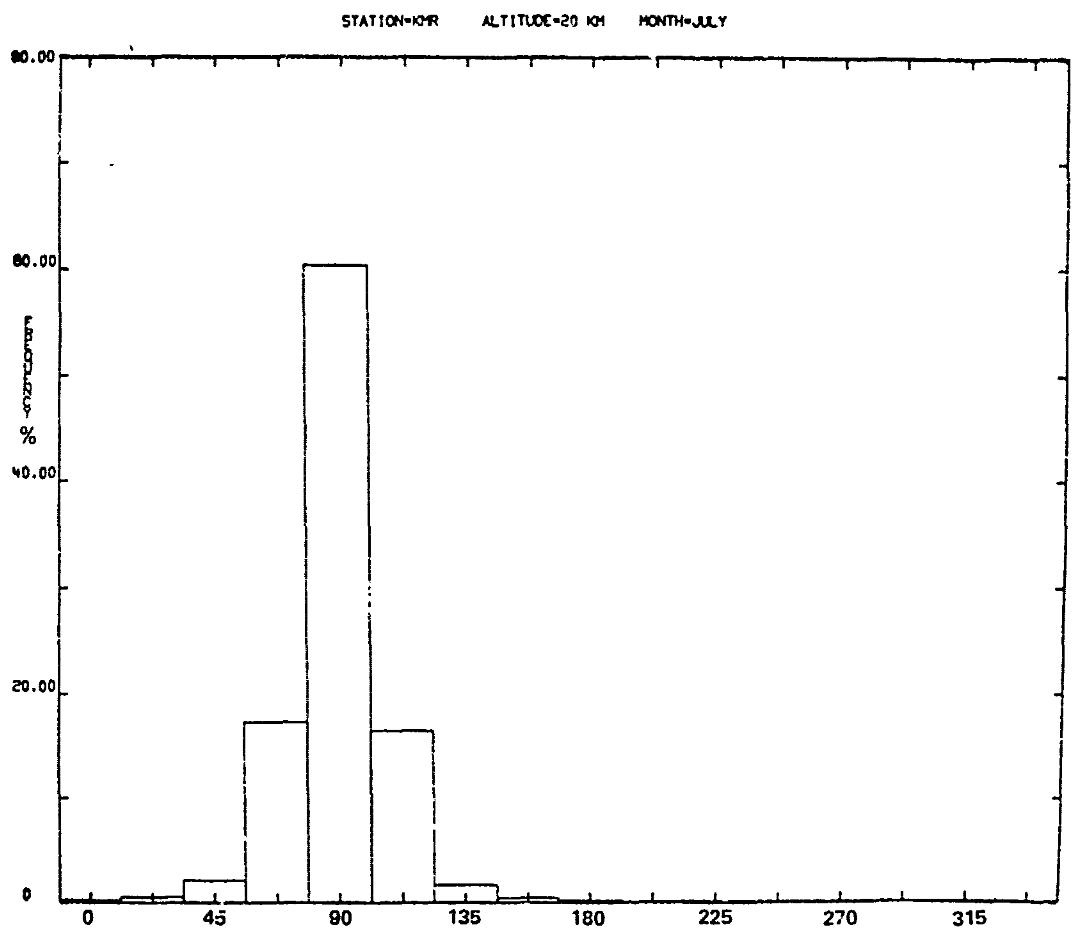


Figure A-8-9. Frequency of wind direction.

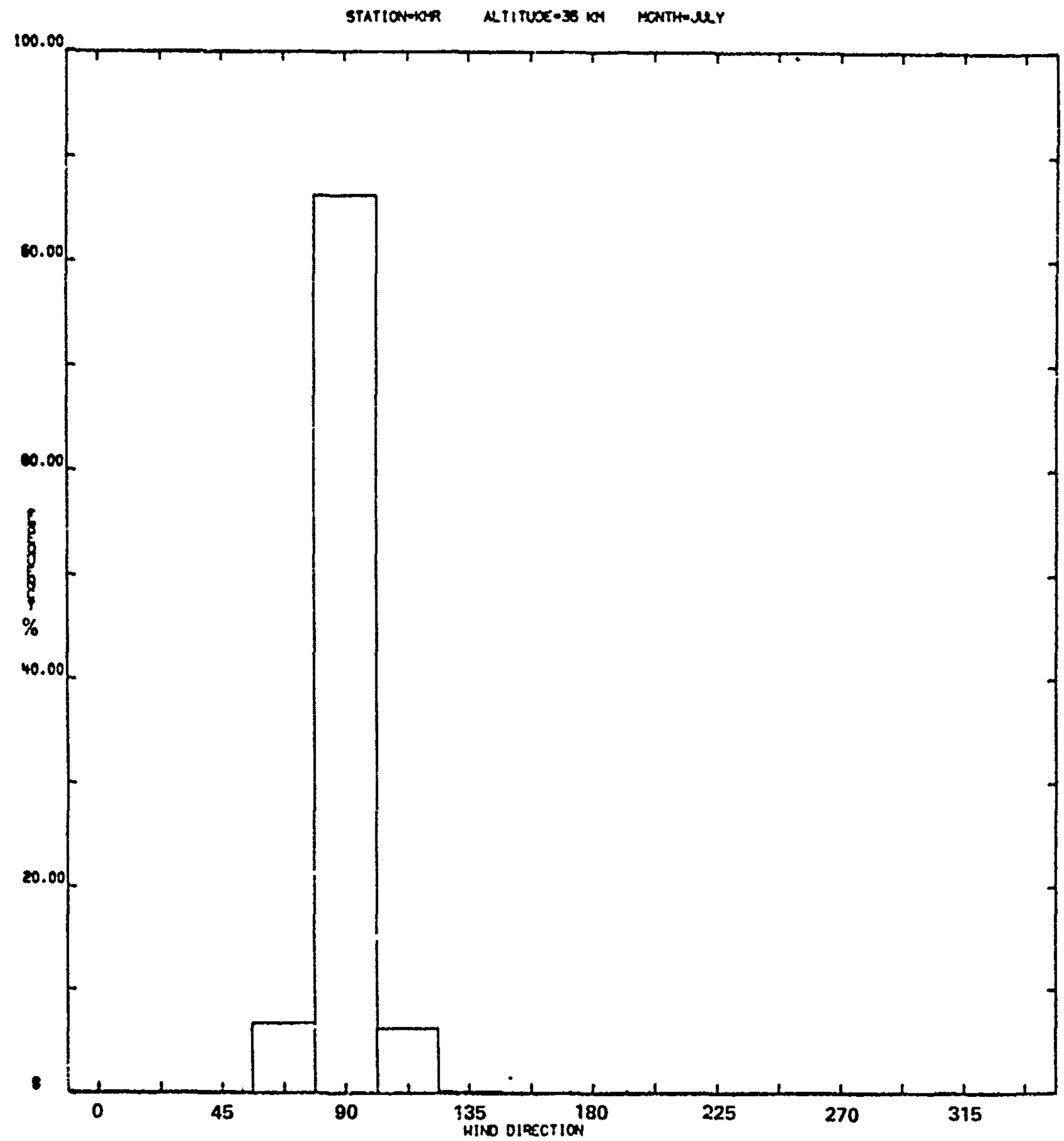


Figure A-8-10. Frequency of wind direction.

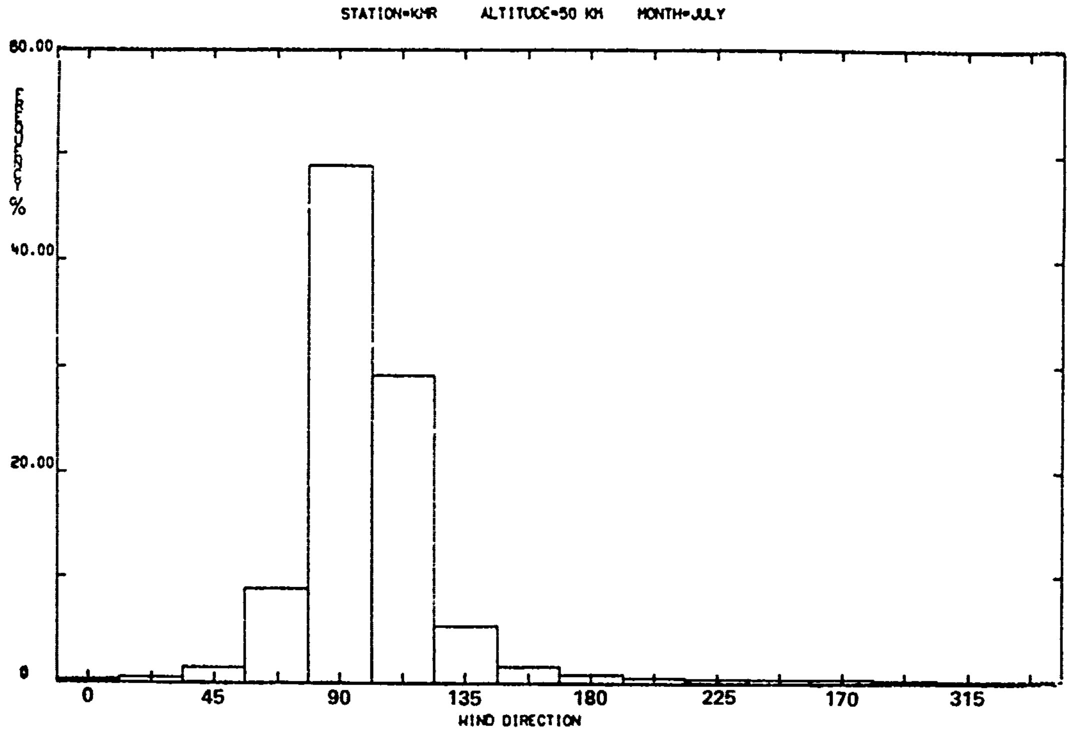


Figure A-8-11. Frequency of wind direction.

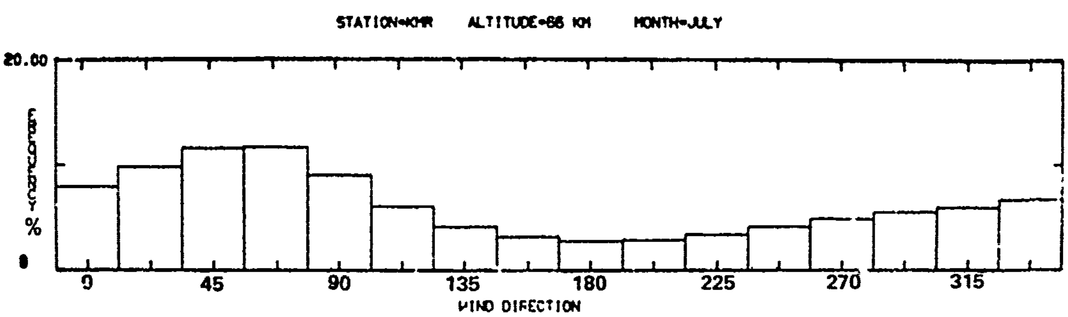


Figure A-8-12. Frequency of wind direction.

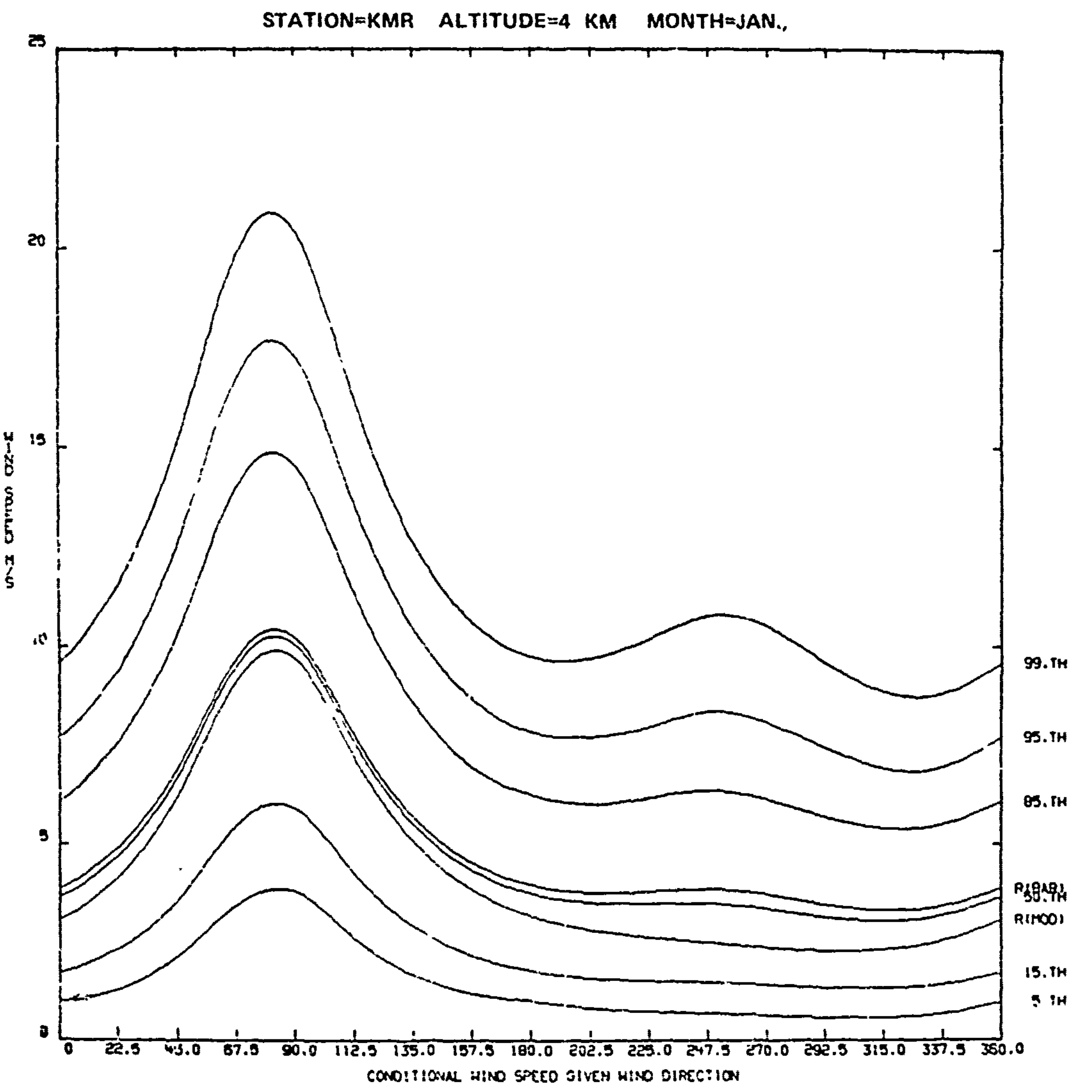


Figure A-9-1. Conditional distribution of wind speeds from the given wind directions cartesian form.

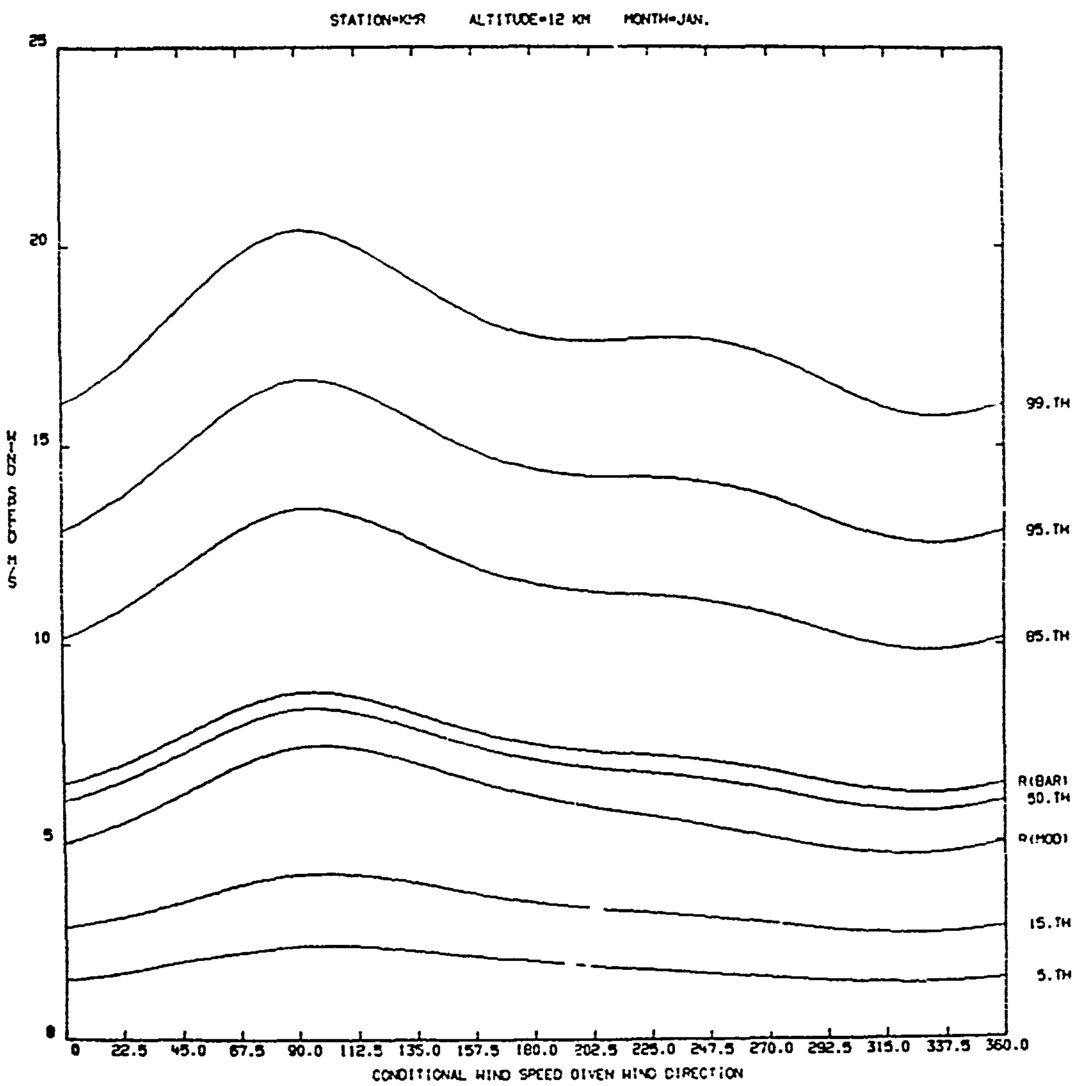


Figure A-9-2. Conditional distribution of wind speeds from the given wind directions cartesian form.

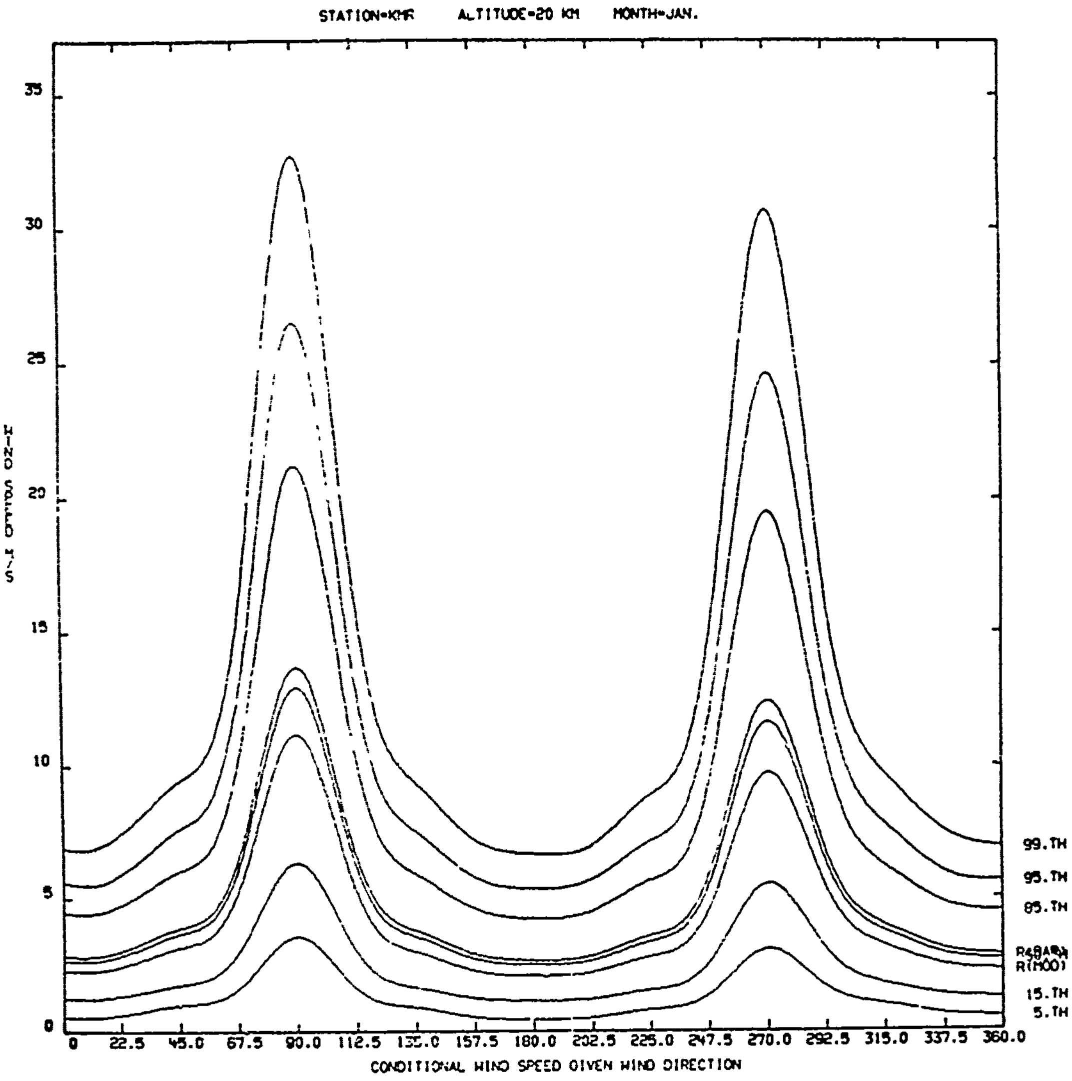


Figure A-9-3. Conditional distribution of wind speeds from the given wind directions cartesian form.

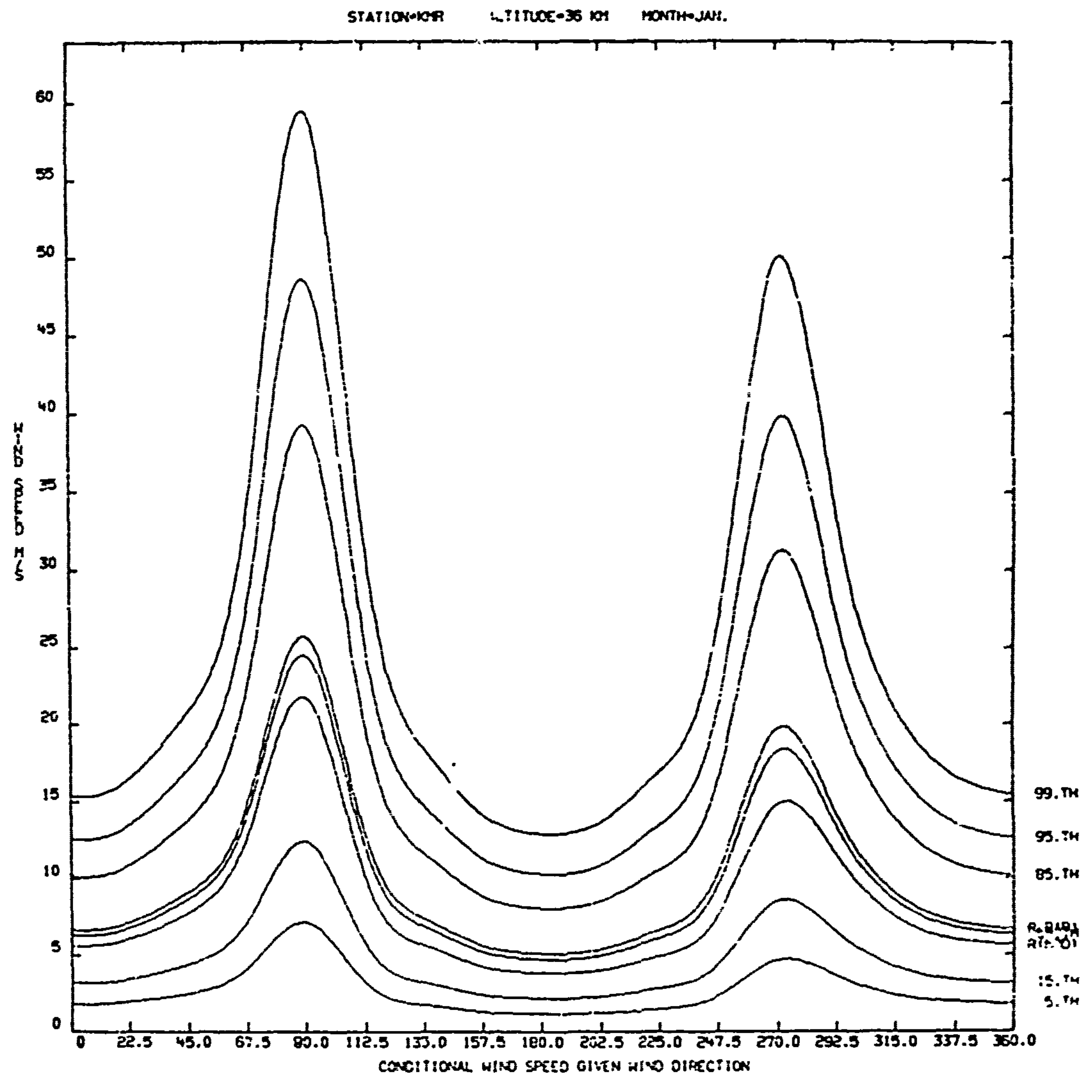


Figure A-9-4. Conditional distribution of wind speeds from the given wind directions cartesian form.

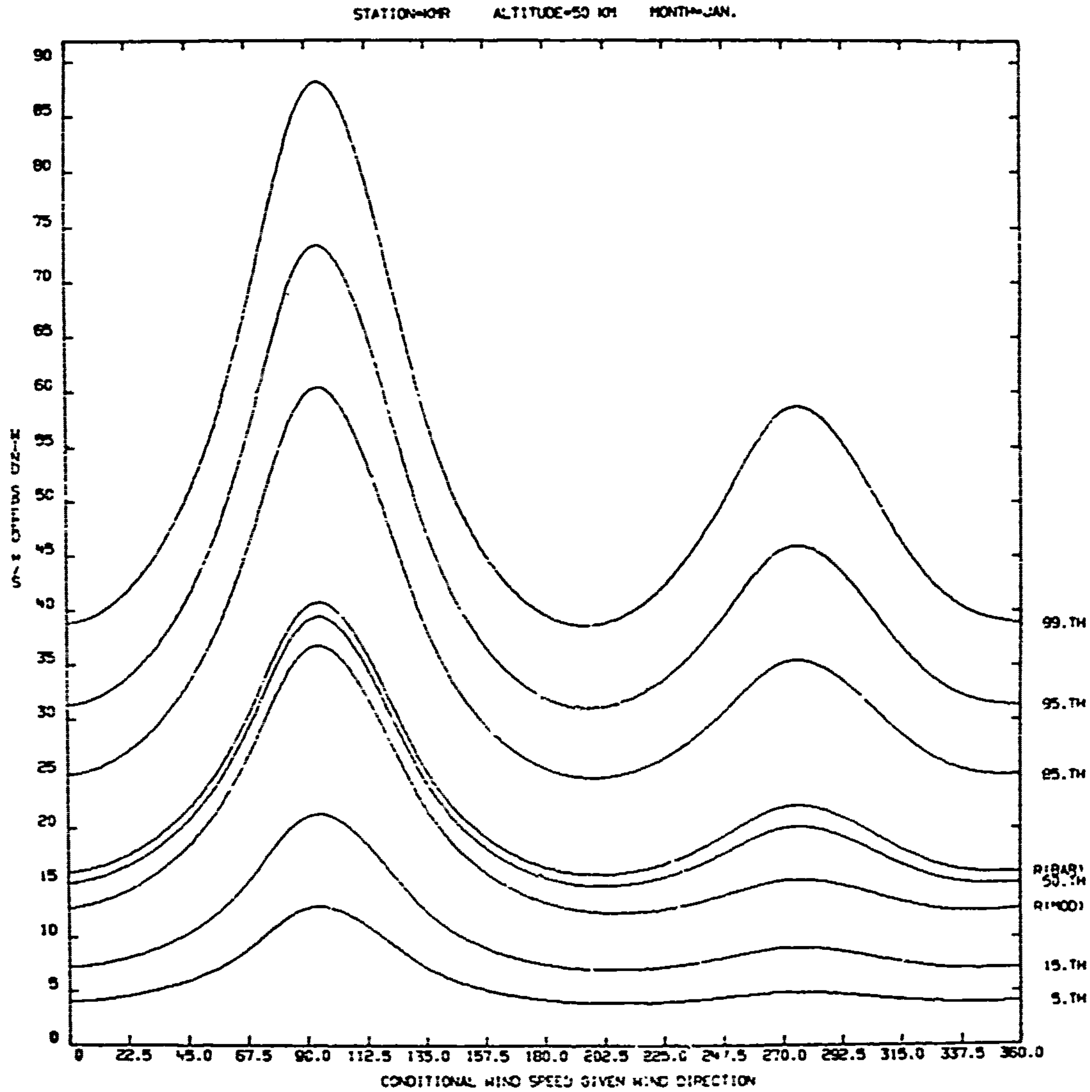


Figure A-9-5. Conditional distribution of wind speeds from the given wind directions cartesian form.

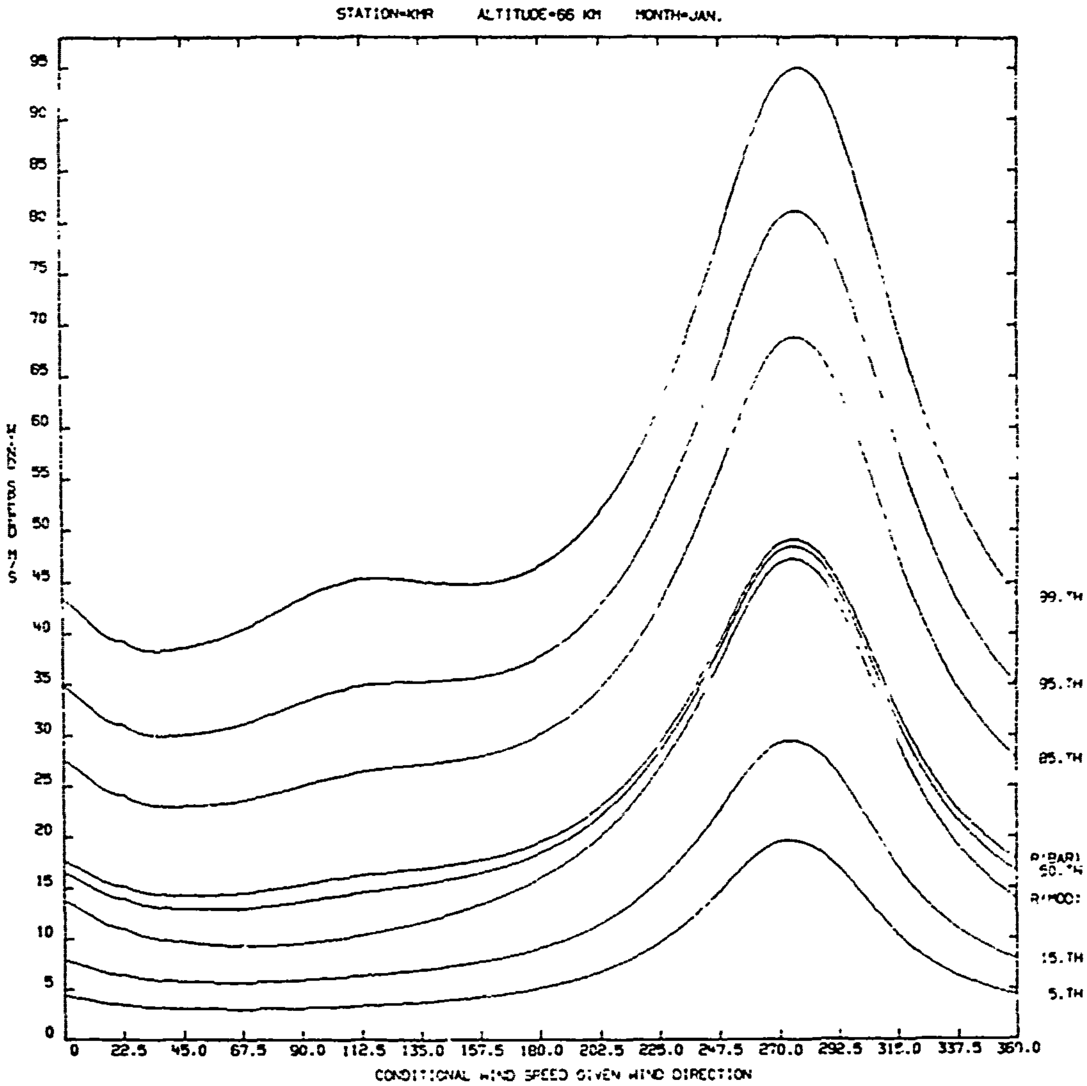


Figure A-9-6. Conditional distribution of wind speeds from the given wind directions cartesian form.

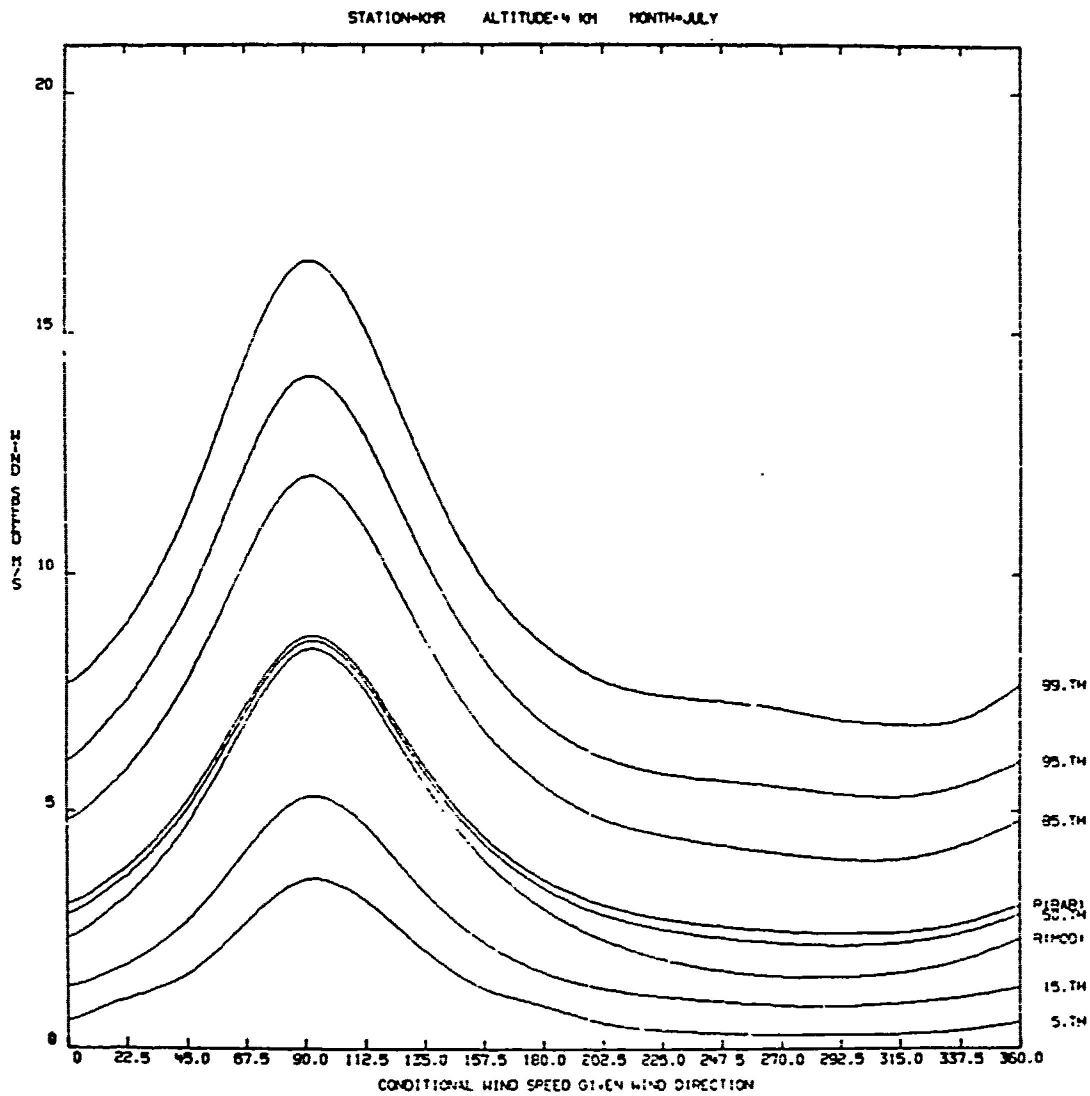


Figure A-9-7. Conditional distribution of wind speeds from the given wind directions cartesian form.

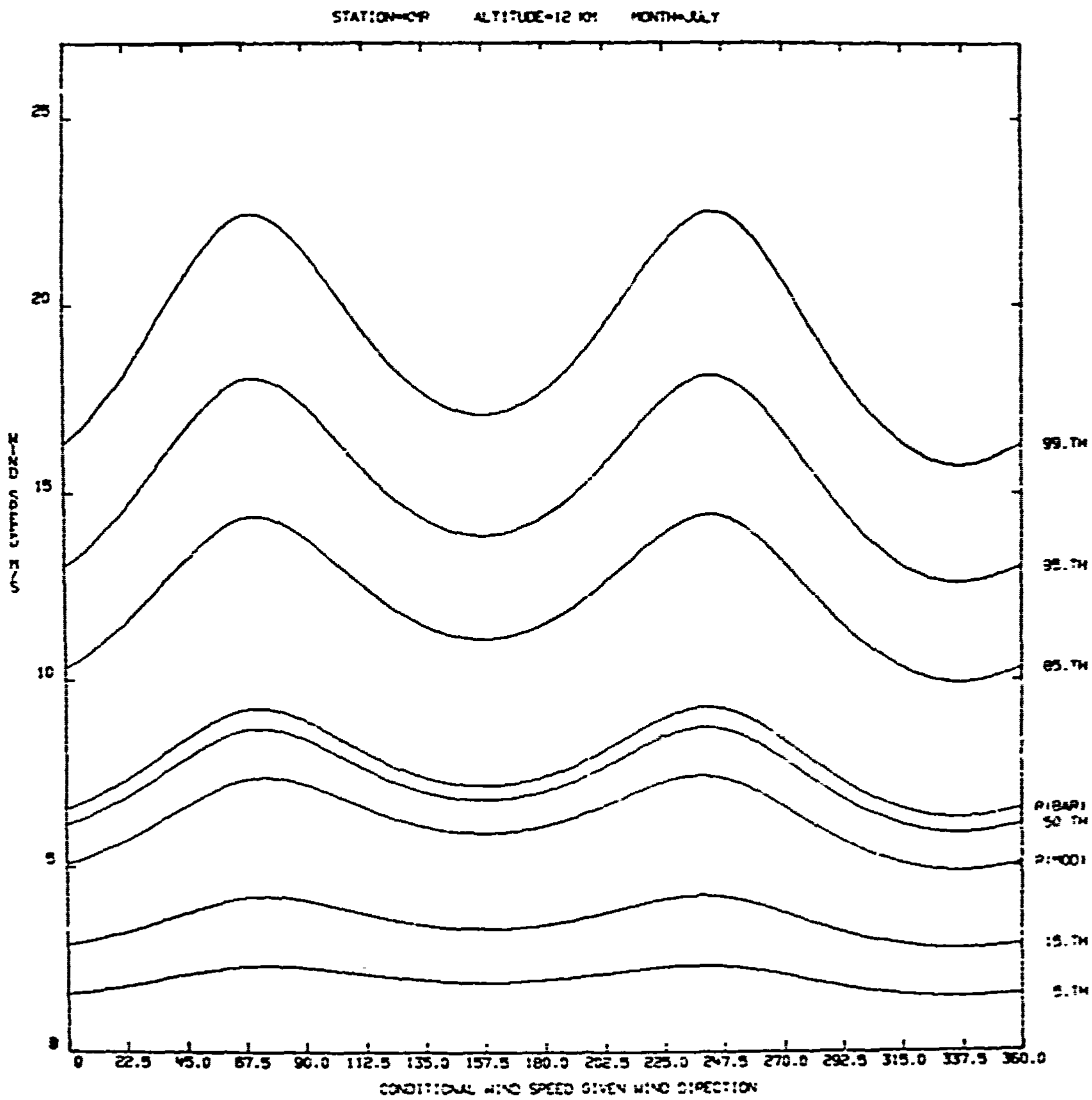


Figure A-9-8. Conditional distribution of wind speeds from the given wind directions cartesian form.

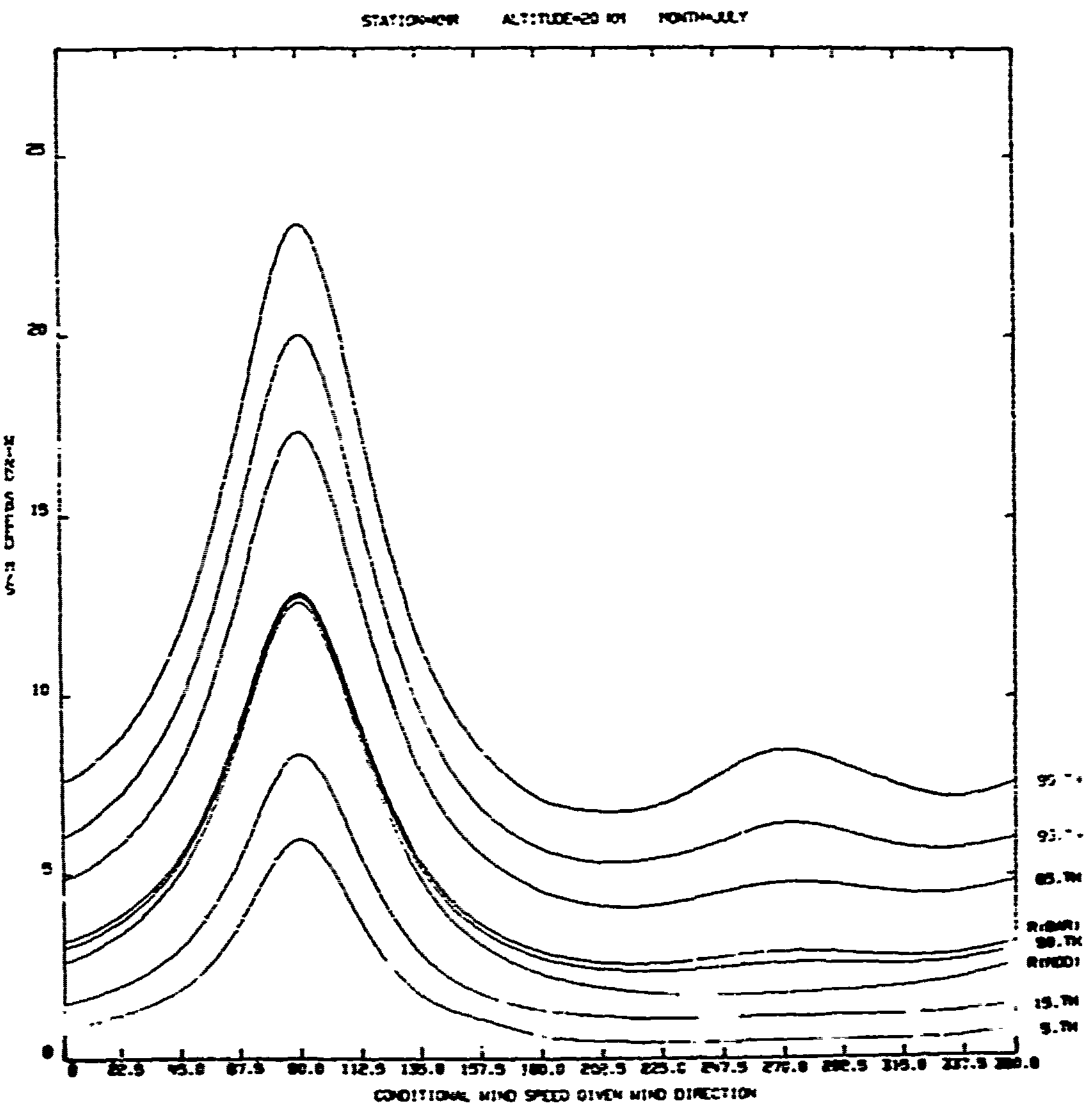


Figure A-9-9. Conditional distribution of wind speeds from the given wind directions cartesian form.

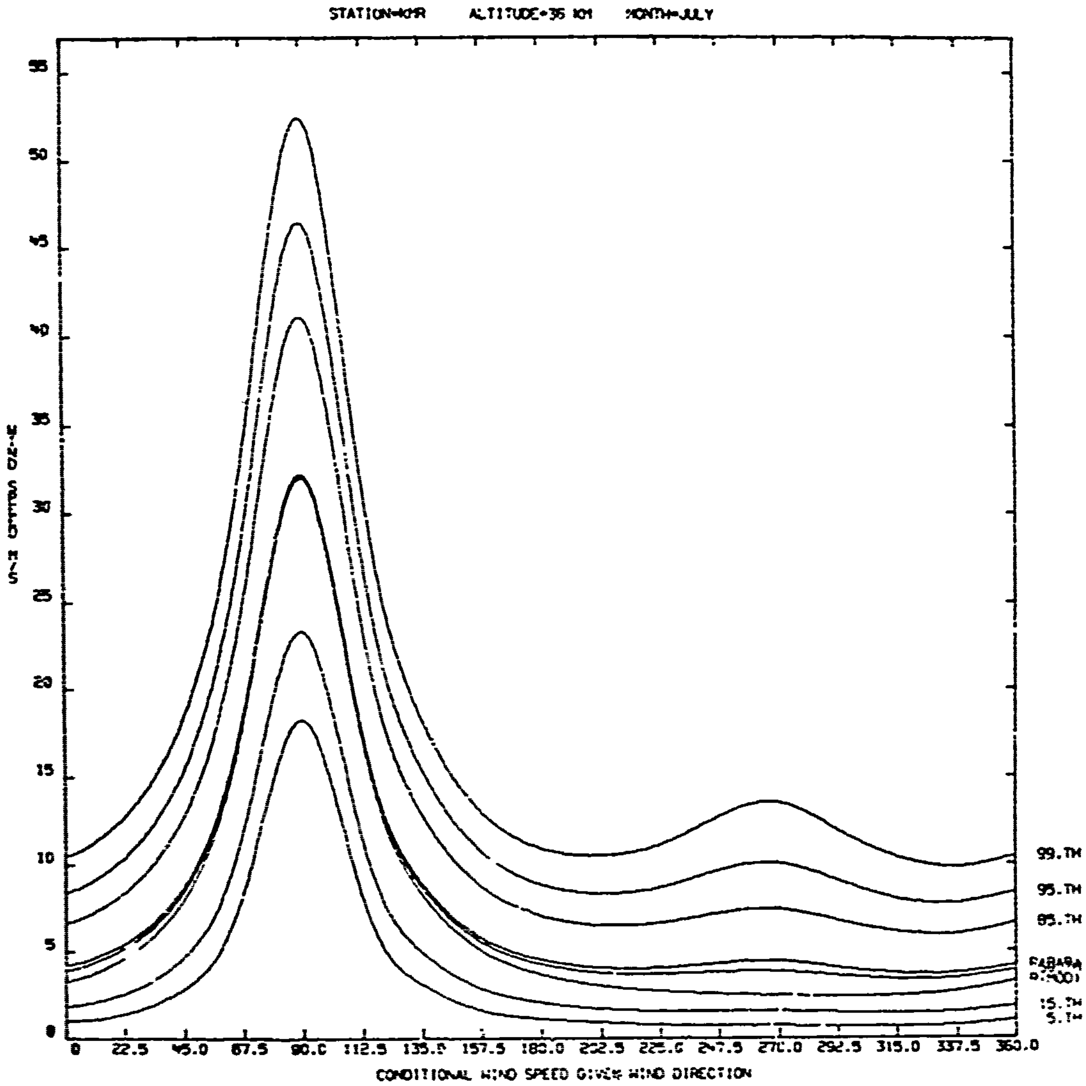


Figure A-9-10. Conditional distribution of wind speeds from the given wind directions cartesian form.

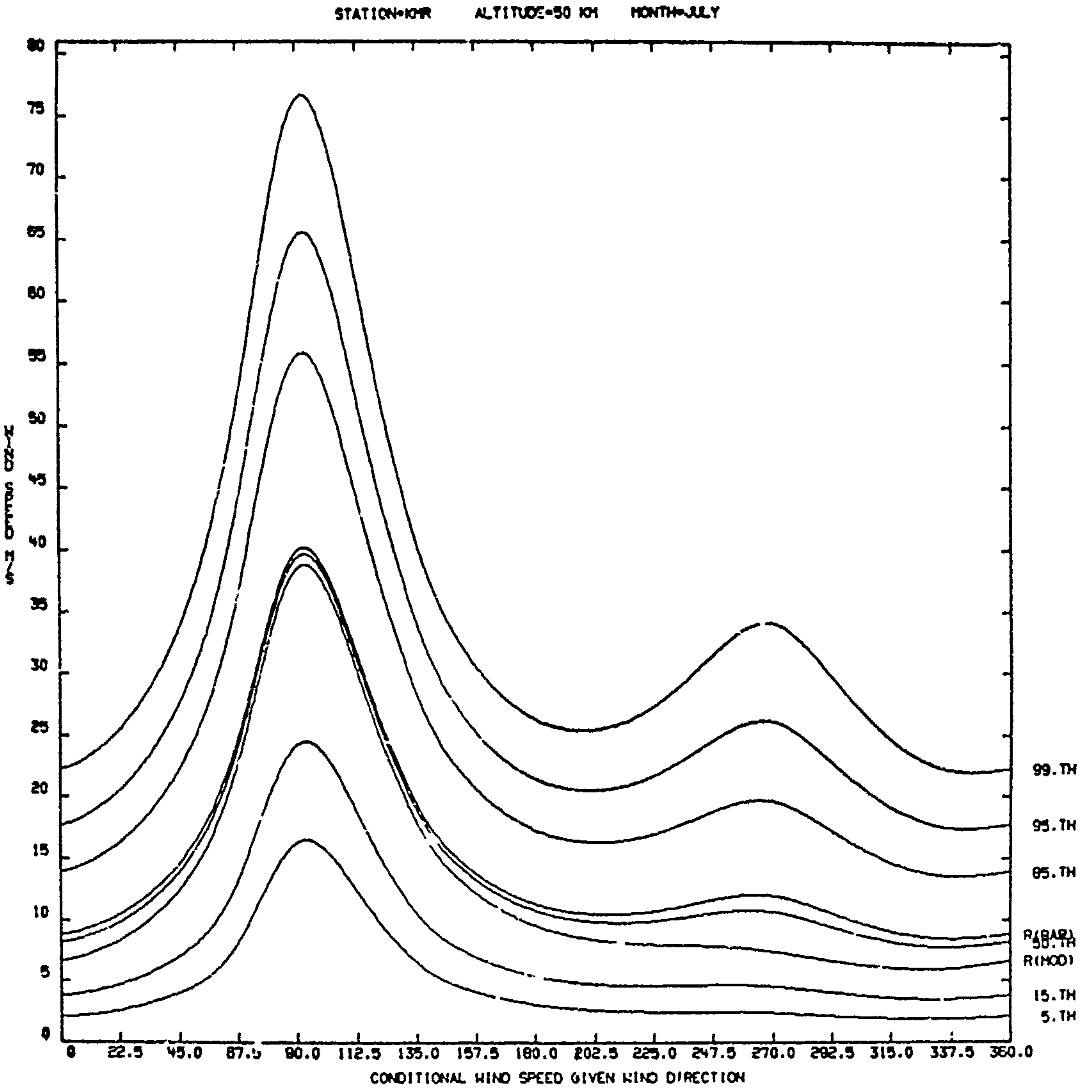


Figure A-9-11. Conditional distribution of wind speeds from the given wind directions cartesian form.

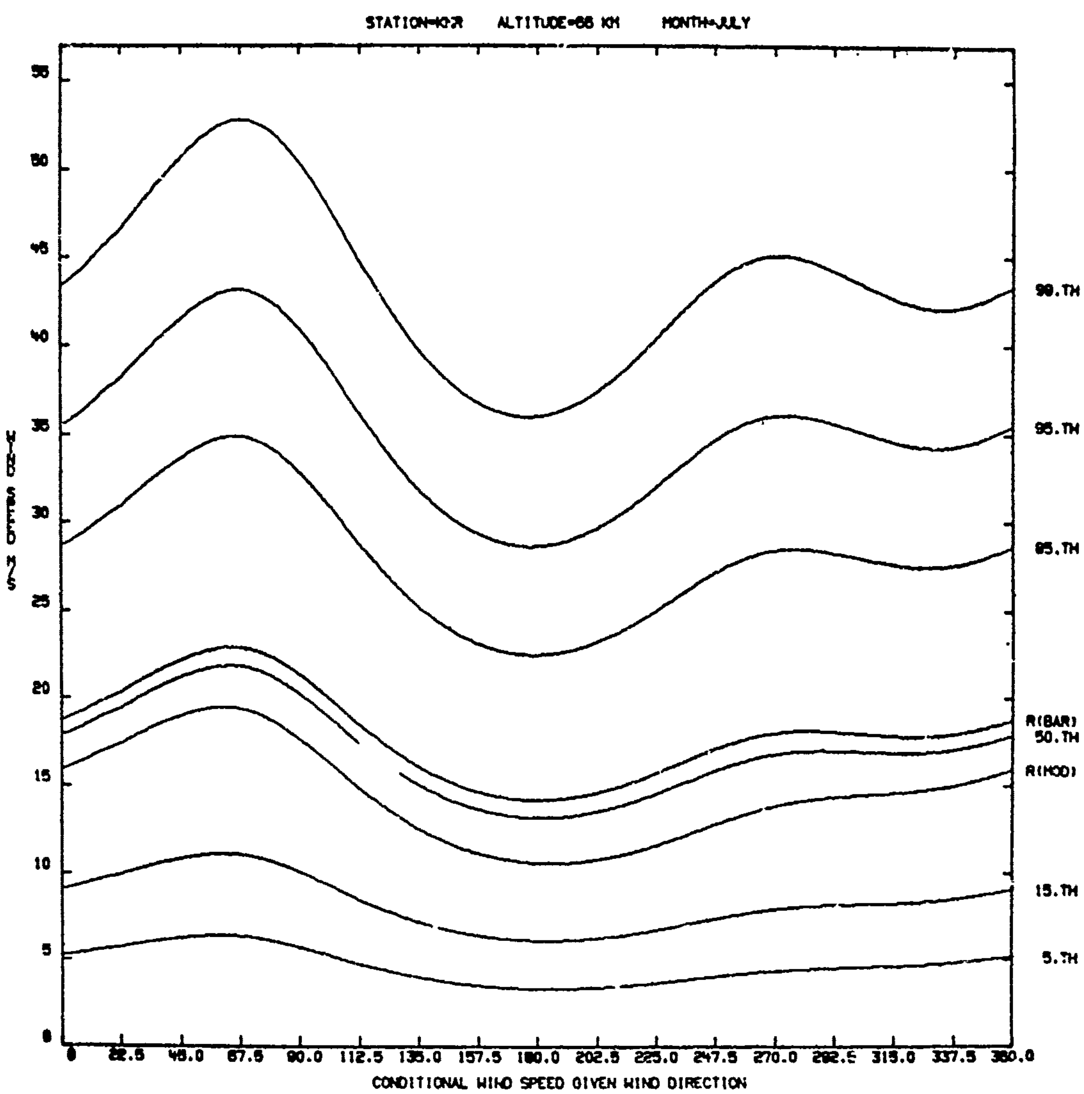


Figure A-9-12. Conditional distribution of wind speeds from the given wind directions cartesian form.

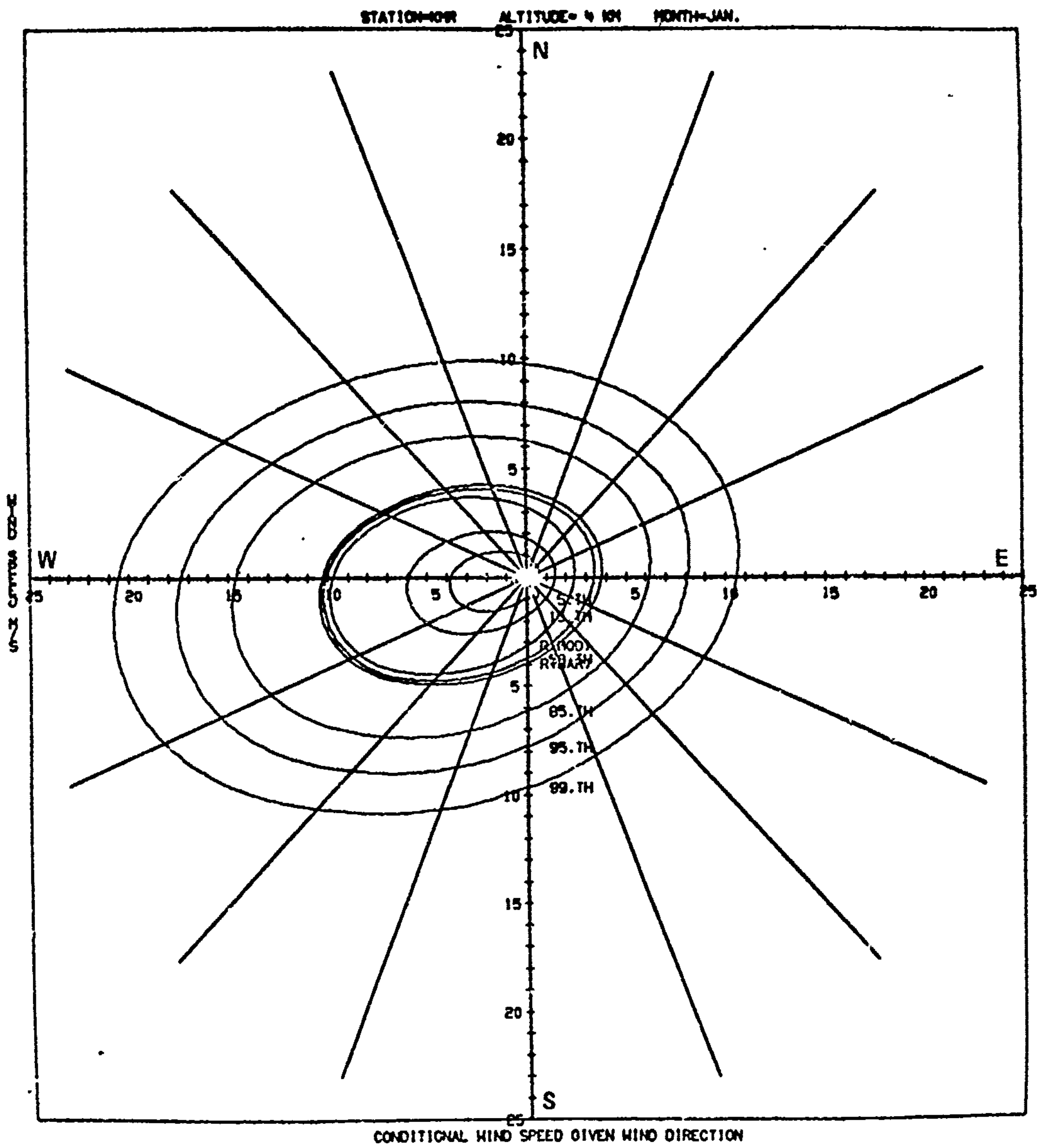


Figure A-10-1. Conditional distribution of wind speeds from the given wind directions polar form.

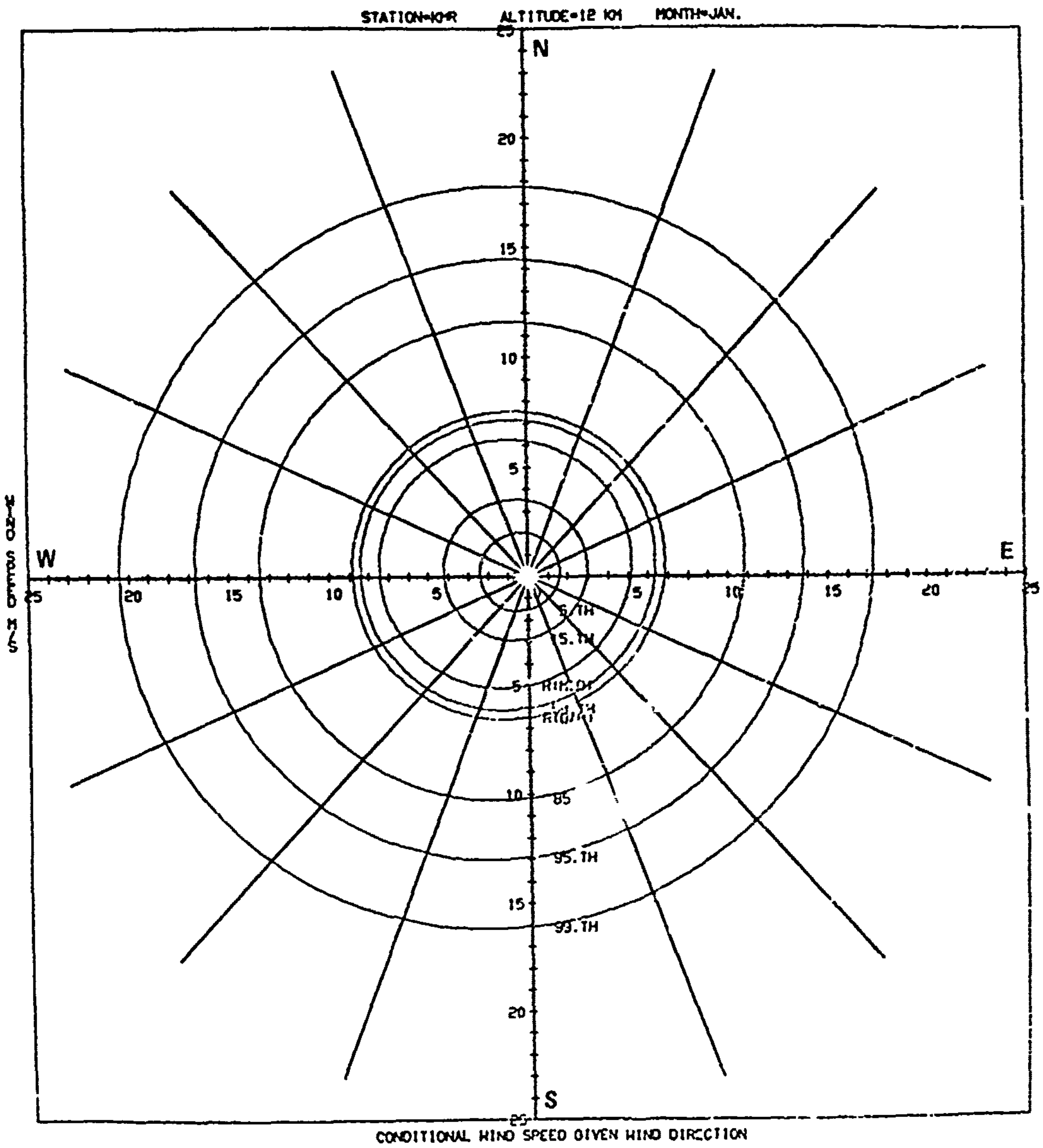


Figure A-10-2. Conditional distribution of wind speeds from the given wind directions polar form.

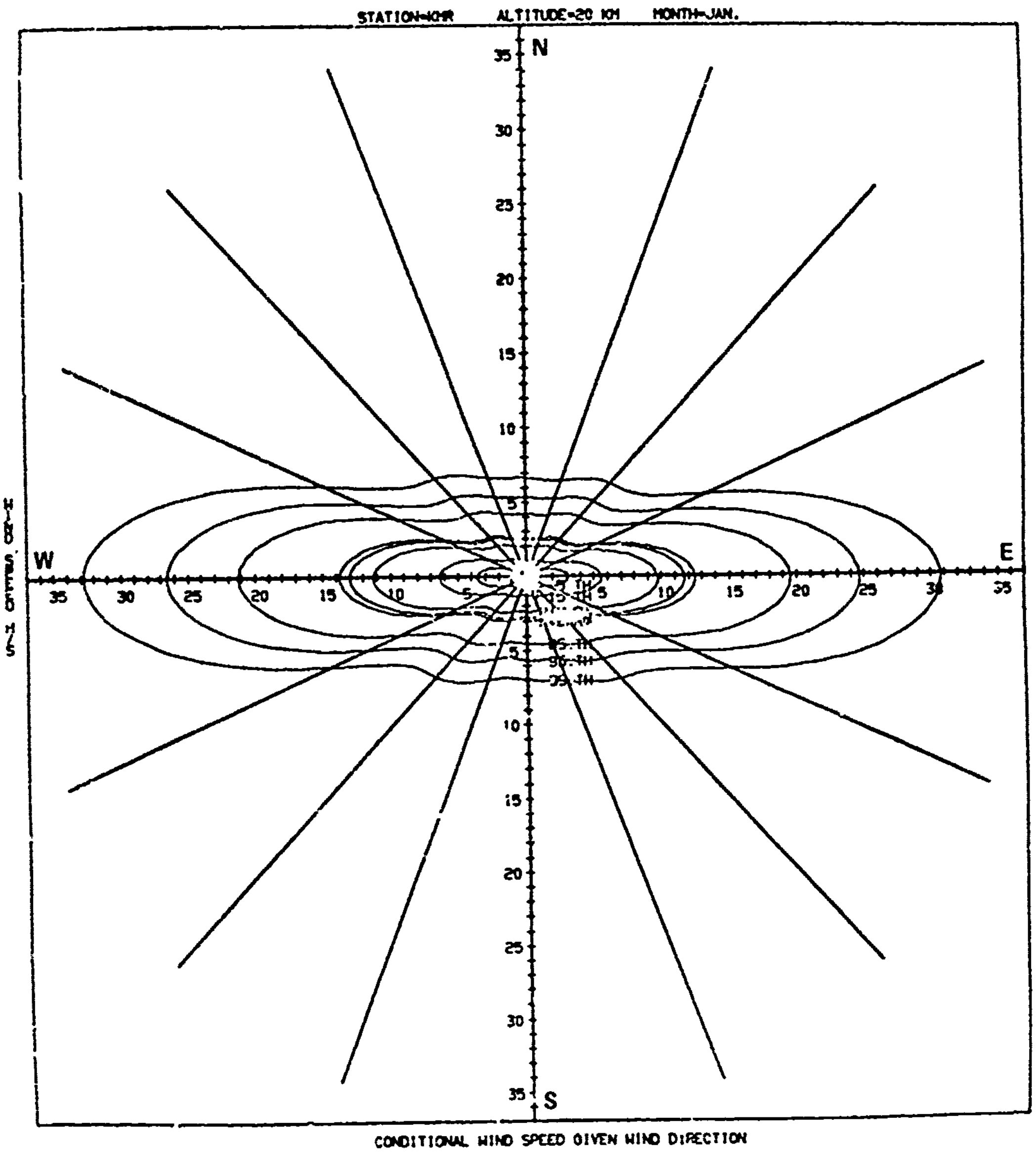


Figure A-10-3. Conditional distribution of wind speeds from the given wind directions polar form.

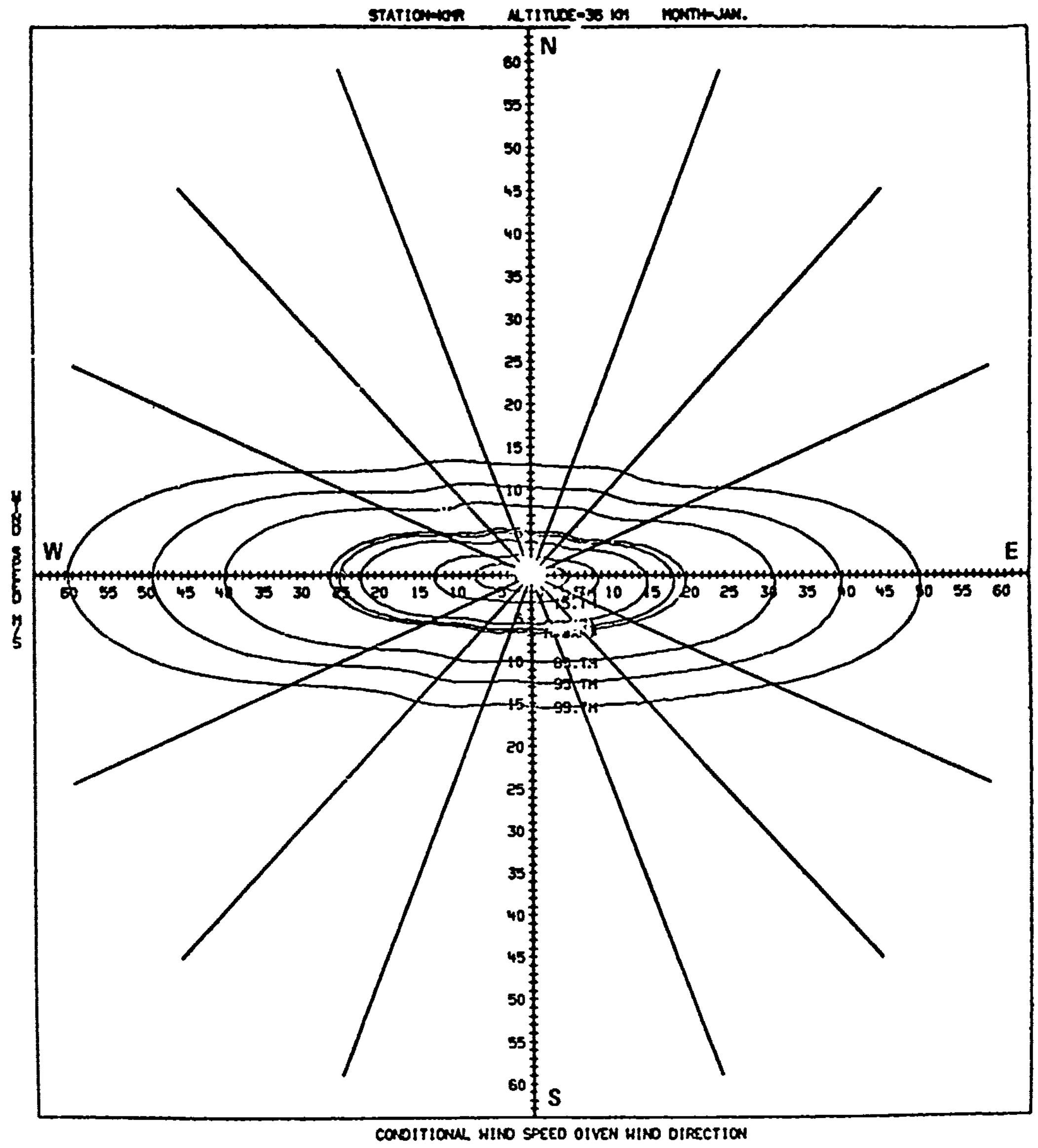


Figure A-10-4. Conditional distribution of wind speeds from the given wind directions polar form.

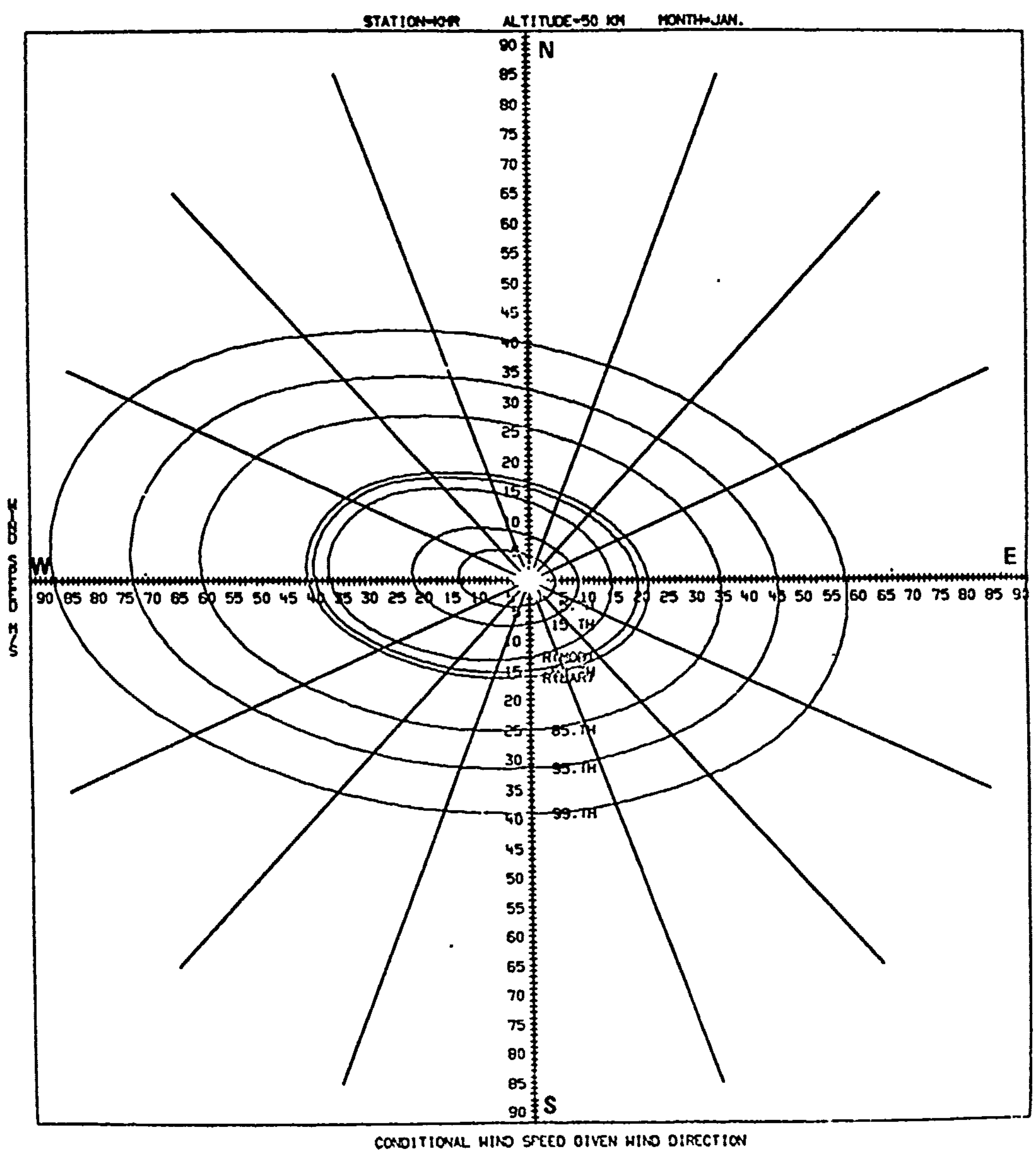


Figure A-10-5. Conditional distribution of wind speeds from the given wind directions polar form.

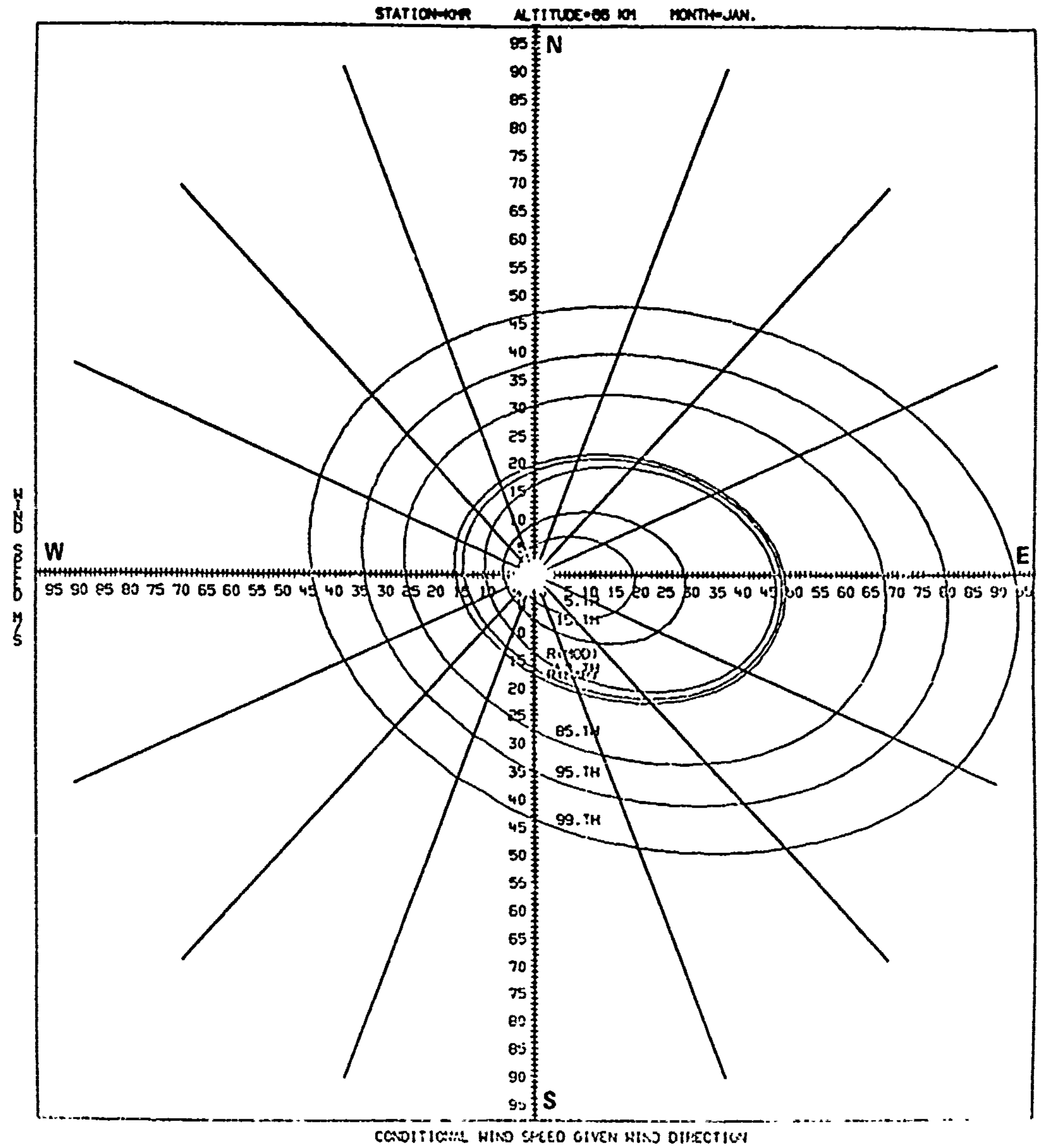


Figure A-10-6. Conditional distribution of wind speeds from the given wind directions polar form.

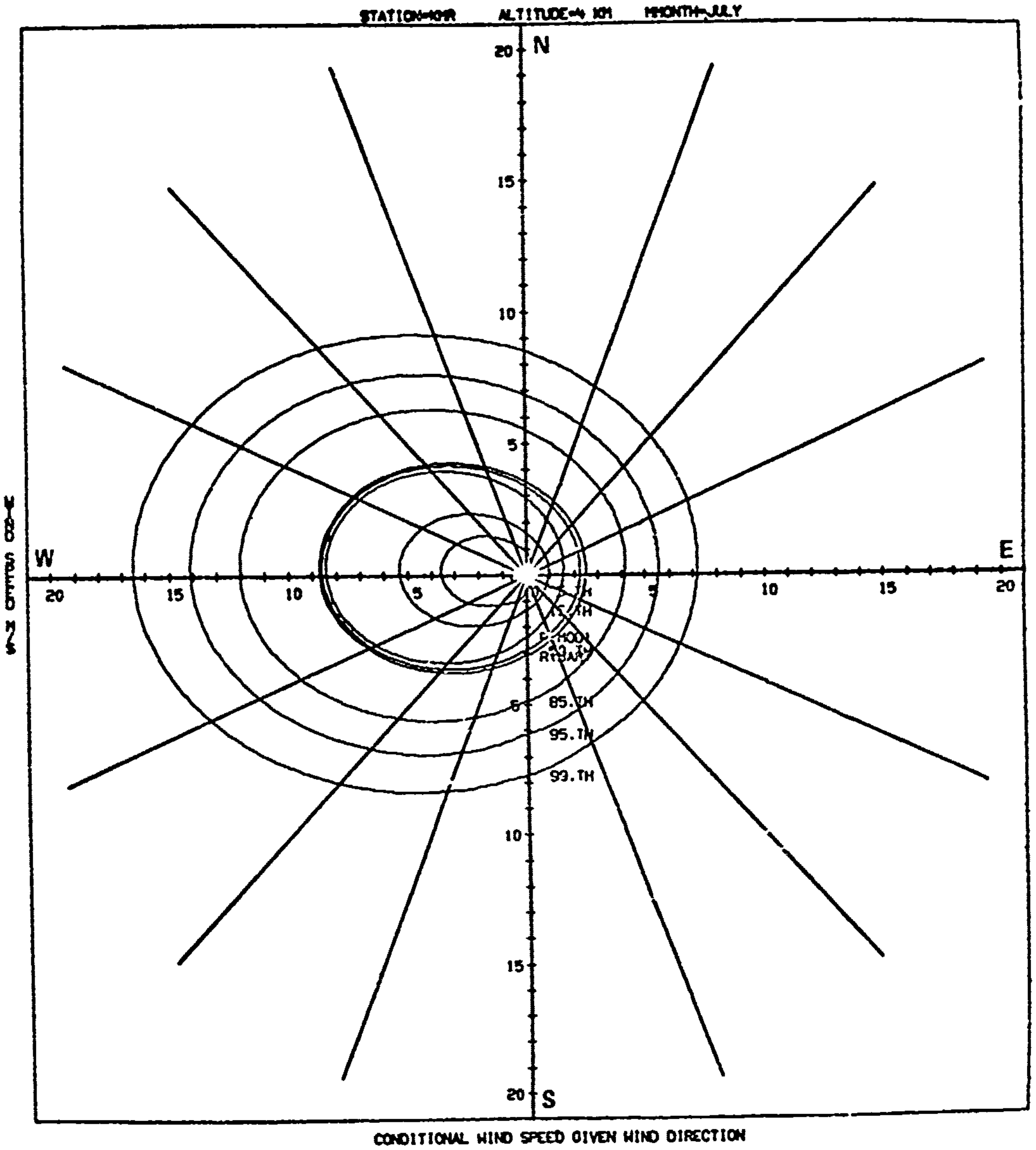


Figure A-10-7. Conditional distribution of wind speeds from the given wind directions polar form.

STATION=KMR ALTITUDE=12 KM MONTH=JULY

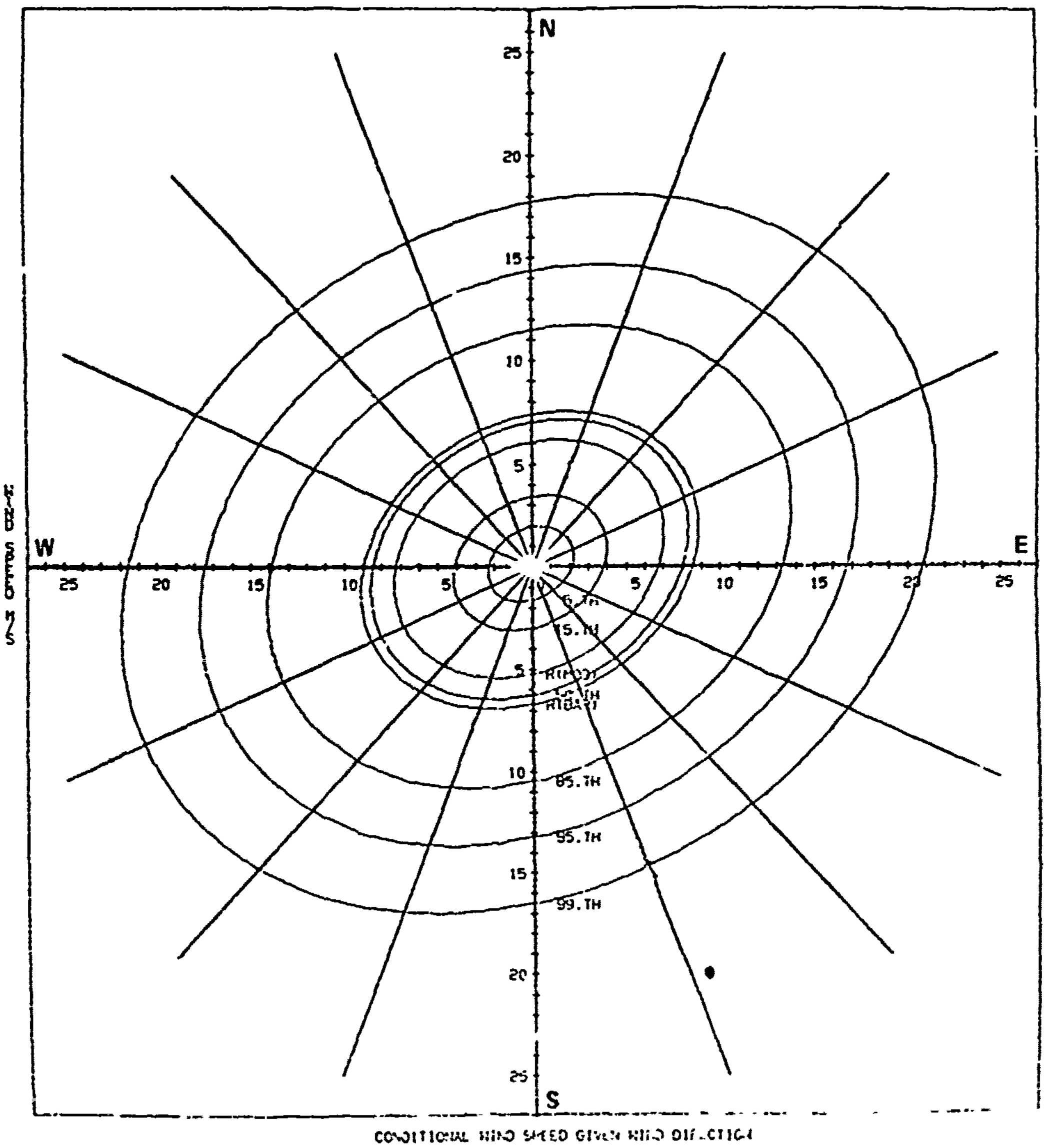


Figure A-10-8. Conditional distribution of wind speeds from the given wind directions polar form.

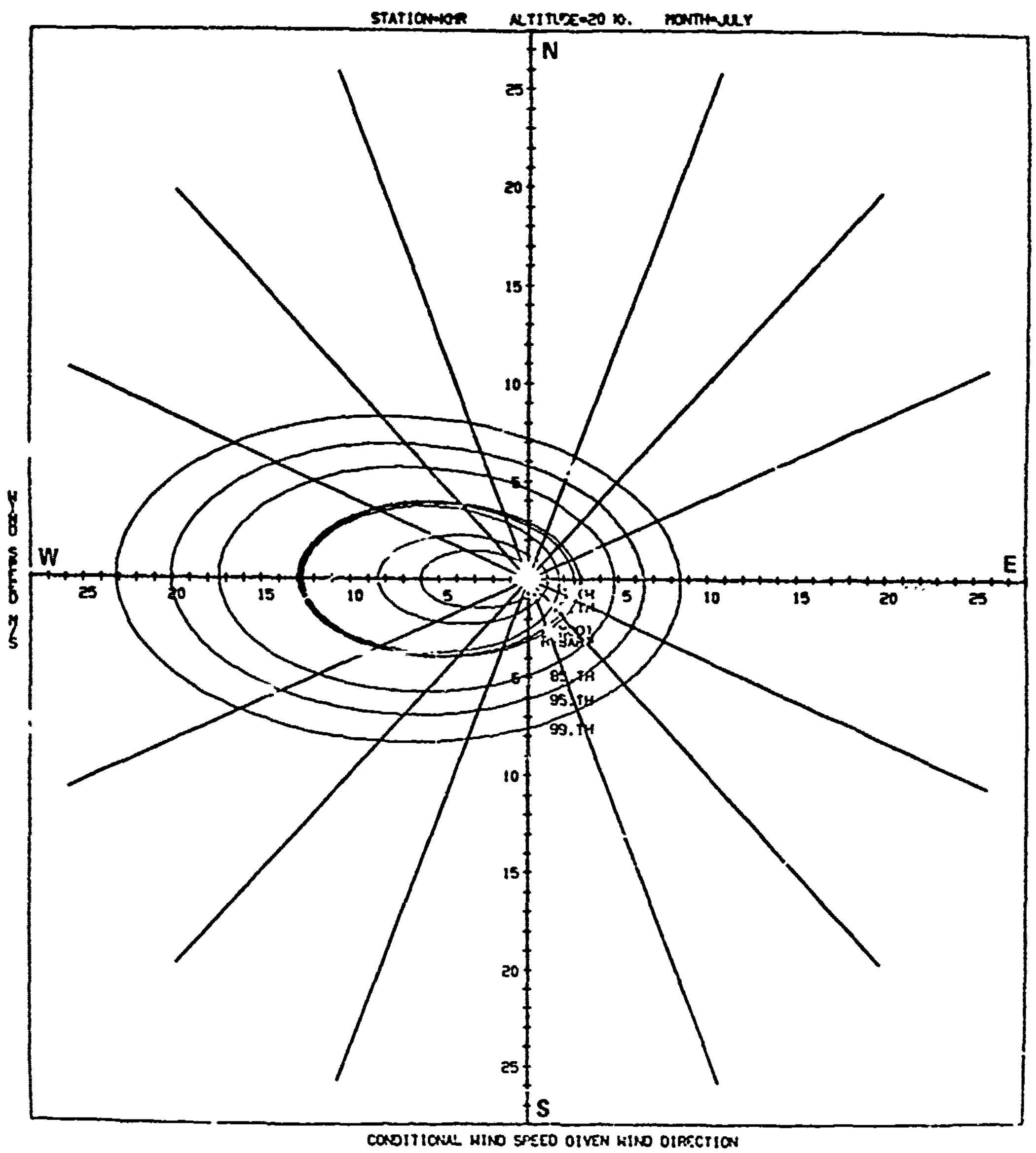


Figure A-10-9. Conditional distribution of wind speeds from the given wind directions polar form.

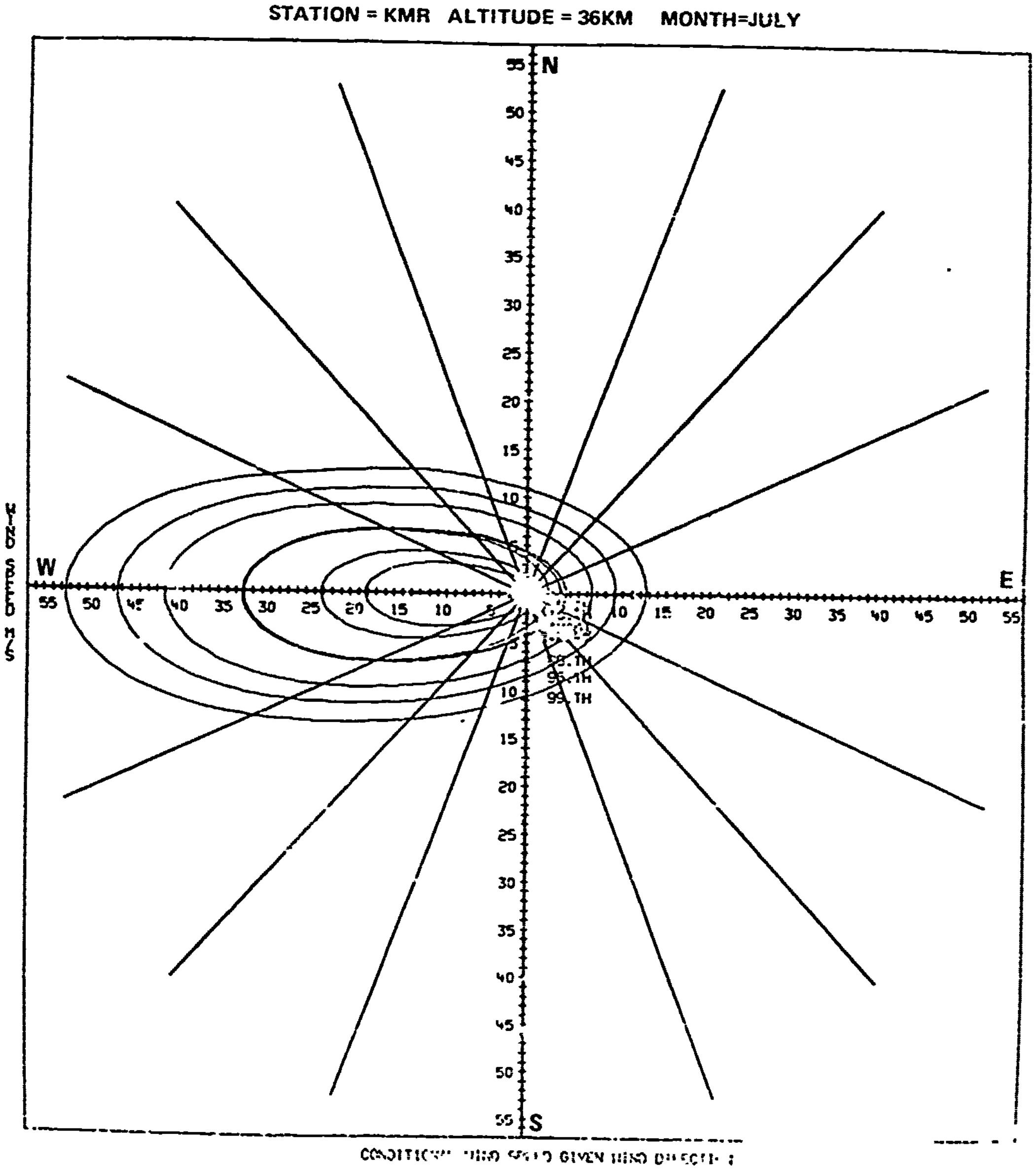


Figure A-10-10. Conditional distribution of wind speeds from the given wind directions polar form.

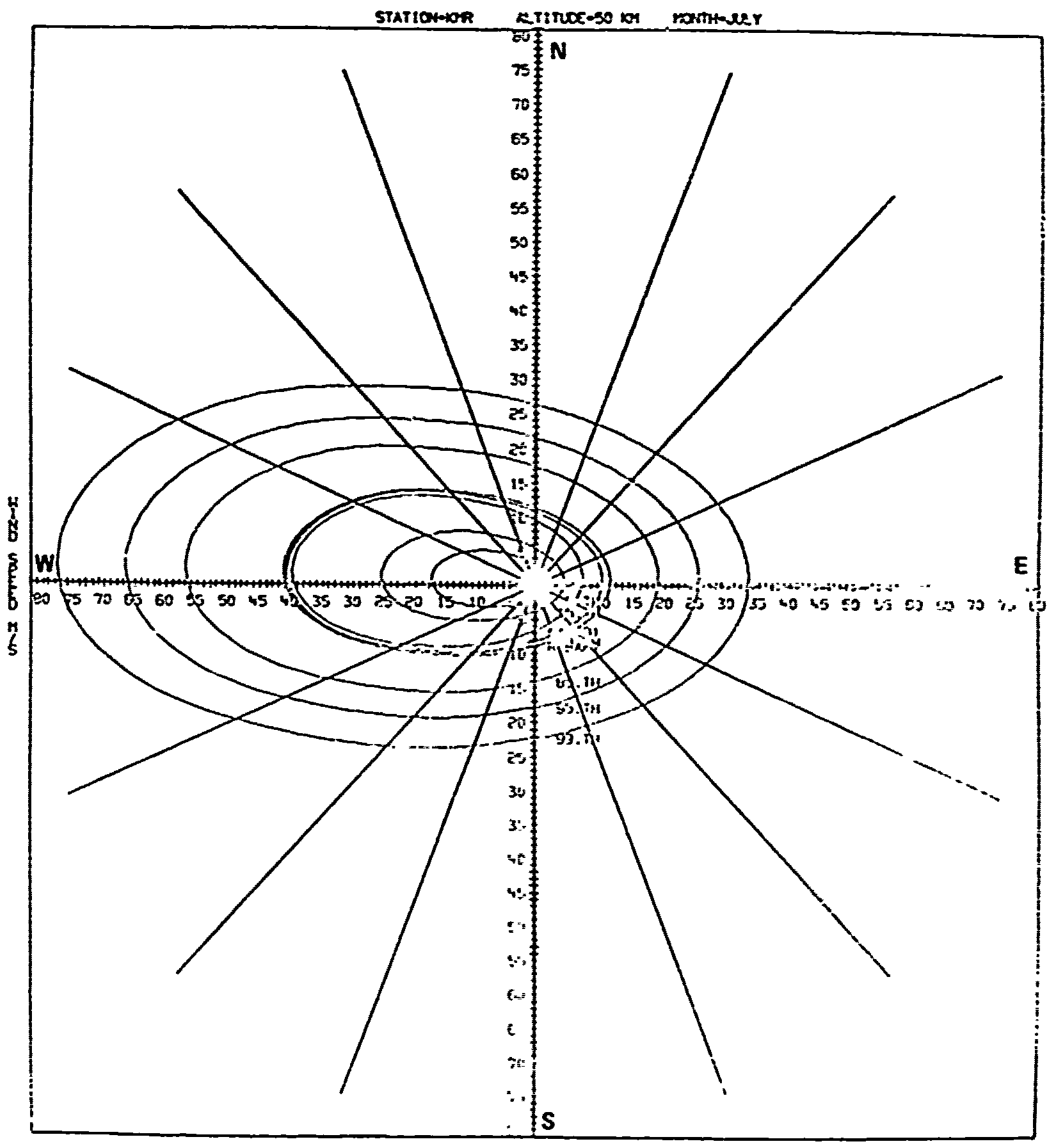


Figure A-10-11. Conditional distribution of wind speeds from the given wind directions polar form.

STATION = KMR ALTITUDE = 66KM MONTH=JULY

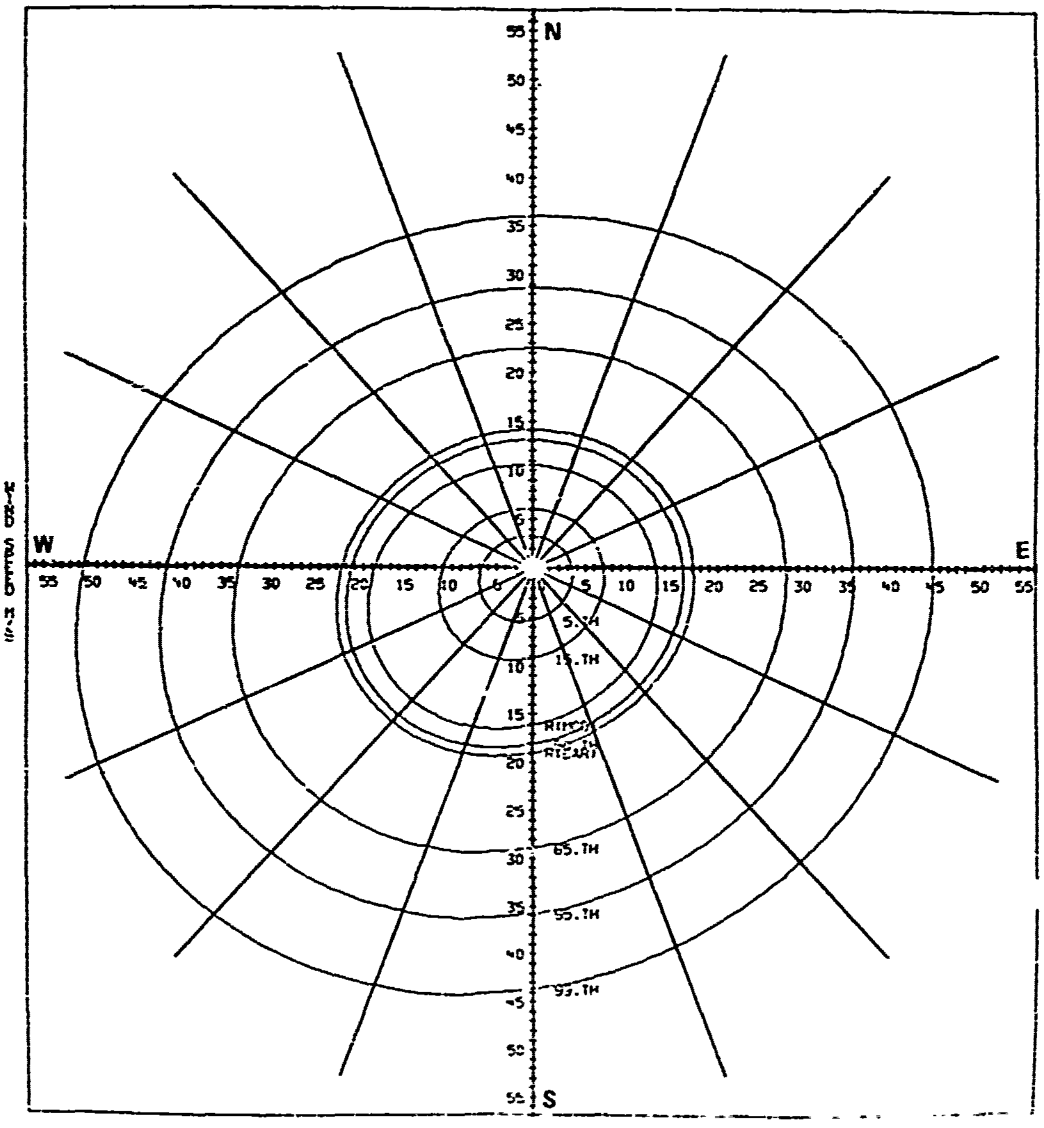


Figure A-10-12. Conditional distribution of wind speeds from the given wind directions polar form.

APPENDIX B

RANGE SPECIFIC INFORMATION

Different periods of record were used to generate the lower ($\leq$ 30 km altitude) and the upper ($\geq$ 30 km altitude) portion of the Kwajalein RRA. The period of record for the lower portion was from January 1960 to December 1974. The changes in the rawinsonde observation times and the monthly distributions of the number of observations precluded the use of the rawinsonde observations for the lower portion of the KMR RRA for the period after December 1974. The upper portion was generated using the rocketsonde measurements for the period of record January 1969 to December 1976.

The rocketsonde observations used to calculate the upper portion of the KMR RRA were taken primarily from 2200 GMT to 0400 GMT. To ensure consistency, only the upper air observations taken during this "time window" were used for the KMR RRA statistics for both the lower portion and the upper portion.

The "time window" restriction on the KMR data base then implies that the KMR RRA is representative of that portion of the diurnal cycle within the time window 2200 GMT to 0400 GMT. Hence, the use of the KMR RRA for time periods outside this time window will be inaccurate depending on the contribution of the interdiurnal variation. In general, the systematic interdiurnal variation of most atmospheric quantities is considered to be small in comparison with the daily random variation above the boundary layer.

Because KMR is in the tropical latitudes, the quasi-biennial oscillation of the wind field and temperature can be detected by a time series analysis of past upper air observations, particularly in the stratosphere. As the term implies, the onset and period of this atmospheric oscillation are not constant. The RRA for KMR has been established for monthly reference periods rather than making an extension to account for past quasi-biennial oscillations because: (a) range program plans are based on a monthly calendar rather than a variable reference period, and (b) there is no univerally accepted technique for predicting the phase and duration of future quasi-biennial oscillations.

To prevent further character size reduction for Tables I through IV certain range specific information has been omitted. This important information is given in Table B1 for KMR.

HEADER RECORD 32 - 70 KM

TABLE NUMBER	0
DATA SOUPCE (1=DATSAV,2=WDC-A)	2
CALL LETTERS	PKWA
WMO NUMBER	91366
LATITUDE	8°44'
DIRECTION (N OR S)	N
LONGITUDE	167°45'
DIRECTION (E OF W)	E
ELEVATION IN METERS	0
START PERIOD OF RECORD (MO-YR)	169
END PERIOD OF RECORD (MO-YR-)	1276
NO. OF TIME WINDOWS (0,1 OR 2)	1
START TIME WINDOW 61(HR-MNZ)	2200
END TIME WINDOWS 61	400
START TIME WINDOW 62	0
END TIME WINDOW 62	0
DATE OF RRA	1080
ALTITUDE RANGE OF RRA LOW LEVEL (KM)	30
ALTITUDE RANGE OF RRA HIGH LEVEL(KM)	70
STANDARD DEVIATION OF THERODYNAMIC LIMITS	6.0
WIND LIMITS	6.0

HEADER RECORD 0-30 KM

TABLE NUMBER	0
DATA SOURCE (1=DATSAV,2=WDC-A)	1
CALL LETTERS	PKWA
WMO NUMBER	913660
LATITUDE	8°44'
DIRECTION (N OR S)	N
LONGITUDE	1[illegible]45'
DIRECTION (E OF W)	E
ELEVATION IN METERS	2
START PERIOD OF RECORD (MO-YR)	160
END PERIOD OF RECORD (MO-YR-)	1274
NO. OF TIME WINDOWS (0,1 OR 2)	1
START TIME WINDOW 61(HR-MNZ)	2200
END TIME WINDOWS 61	400
START TIME WINDOW 62	0
END TIME WINDOW 62	0
DATE OF RRA	980
ALTITUDE RANGE OF RRA LOW LEVEL (KM)	0
ALTITUDE RANGE OF RRA HIGH LEVEL(KM)	30
STANDARD DEVIATION OF THERODYNAMIC LIMITS	6.0
WIND LIMITS	6.0

Graphical Displays of Thermodynamic Quantities

The differences for the monthly mean values of pressure, density, and temperature for January (Table IV.1) and July (Table IV.7) relative to the annual mean values (Table IV.13) expressed in percent are shown respectively in Figures B1, B2, B3 (for January) and Figures B6, B7, B8 (for July), and for all months in Figures B11, B12, and B13. Further, the differences of the January and July monthly mean temperature from the annual mean temperature expressed as delta degree(s) K are shown in Figures B4 and B9, and for all months in Figure B14. In these figures the altitude regions having the smallest and largest monthly mean differences from the annual mean for these thermodynamic quantities are clearly seen.

The coefficients of variation for pressure, C_VP, density, C_VD, and temperature, C_VT, were computed using the standard deviation values from Table II and the monthly mean values from Table IV. The coefficient of variation is defined by the standard deviation with respect to the monthly mean divided by the monthly mean value.

The coefficients of variations for pressure, density, and temperature are shown in Figure B5 for January and Figure B10 for July. For all months the coefficient of variation for pressure is shown in Figure 15, for density in Figure 16, and for temperature in Figure 17. If the abscissa on the figures is multiplied by 100, then these figures would show the percentage of the random dispersion over the month with respect to the monthly mean for these thermodynamic quantities.

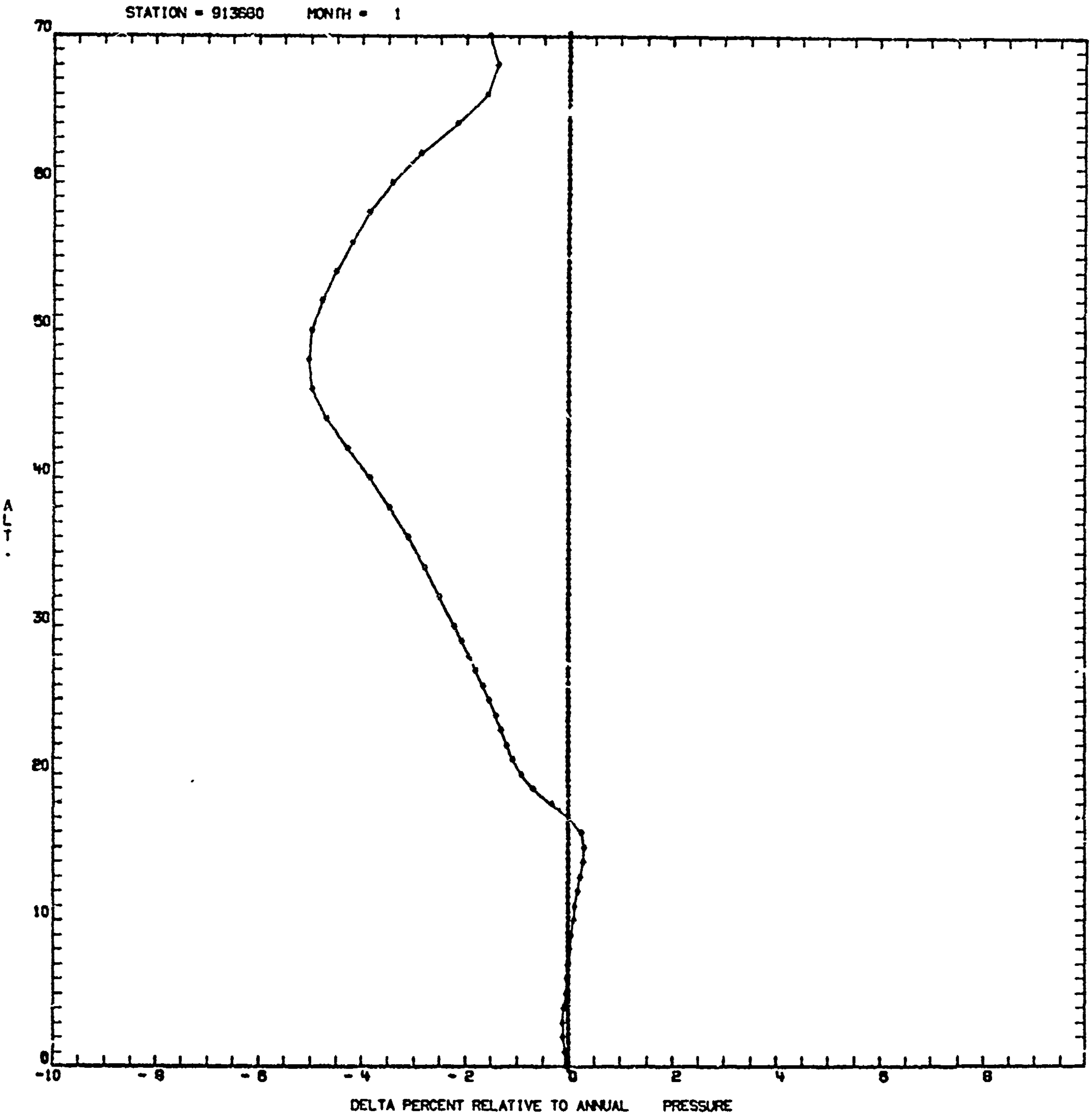

STATION = 913680 MONTH = 1
ALT.
DELTA PERCENT RELATIVE TO ANNUAL PRESSURE
70
60
50
40
30
20
10
0
-10
-8
-6
-4
-2
0
2
4
6
8

Figure B1.

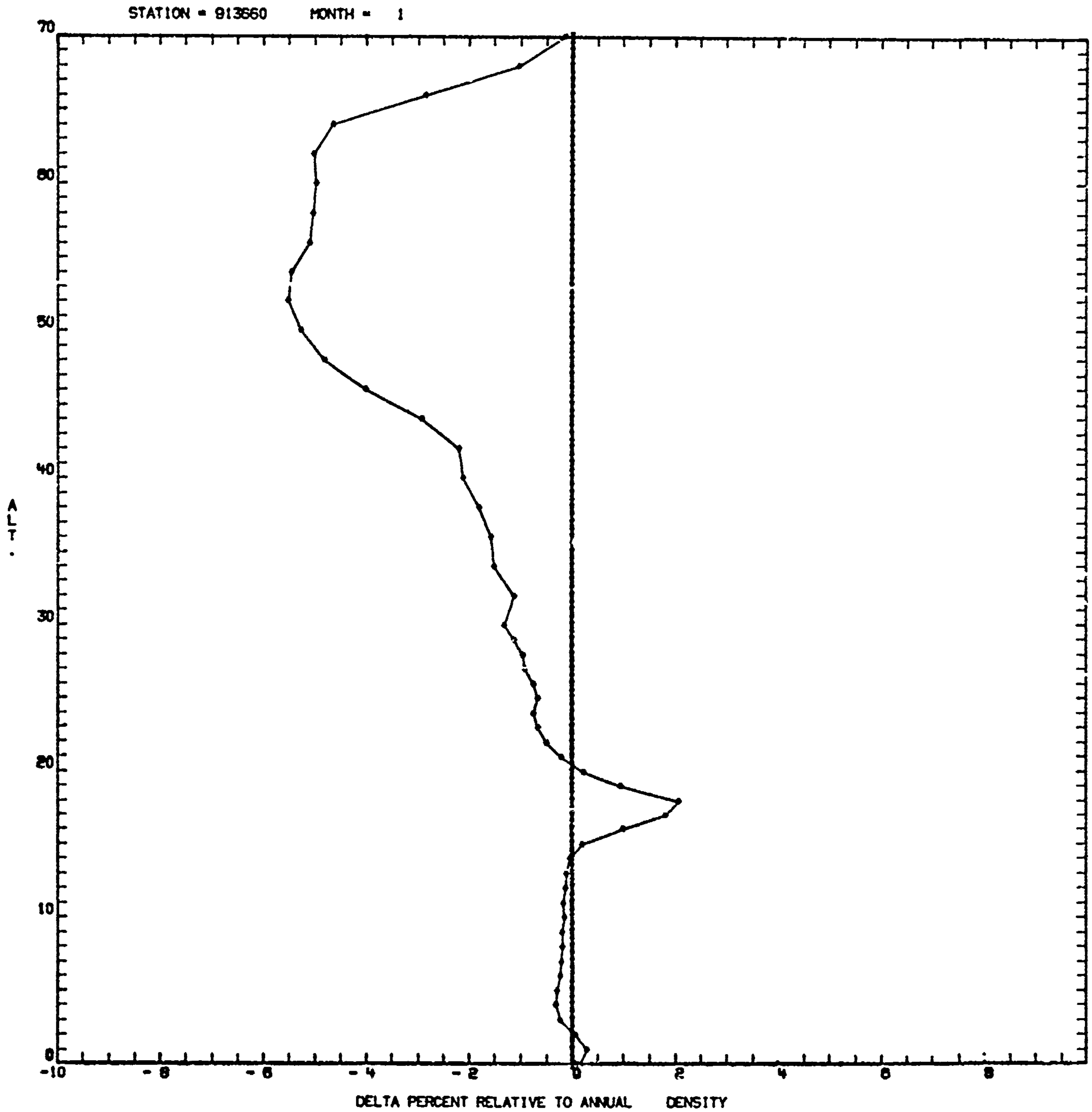
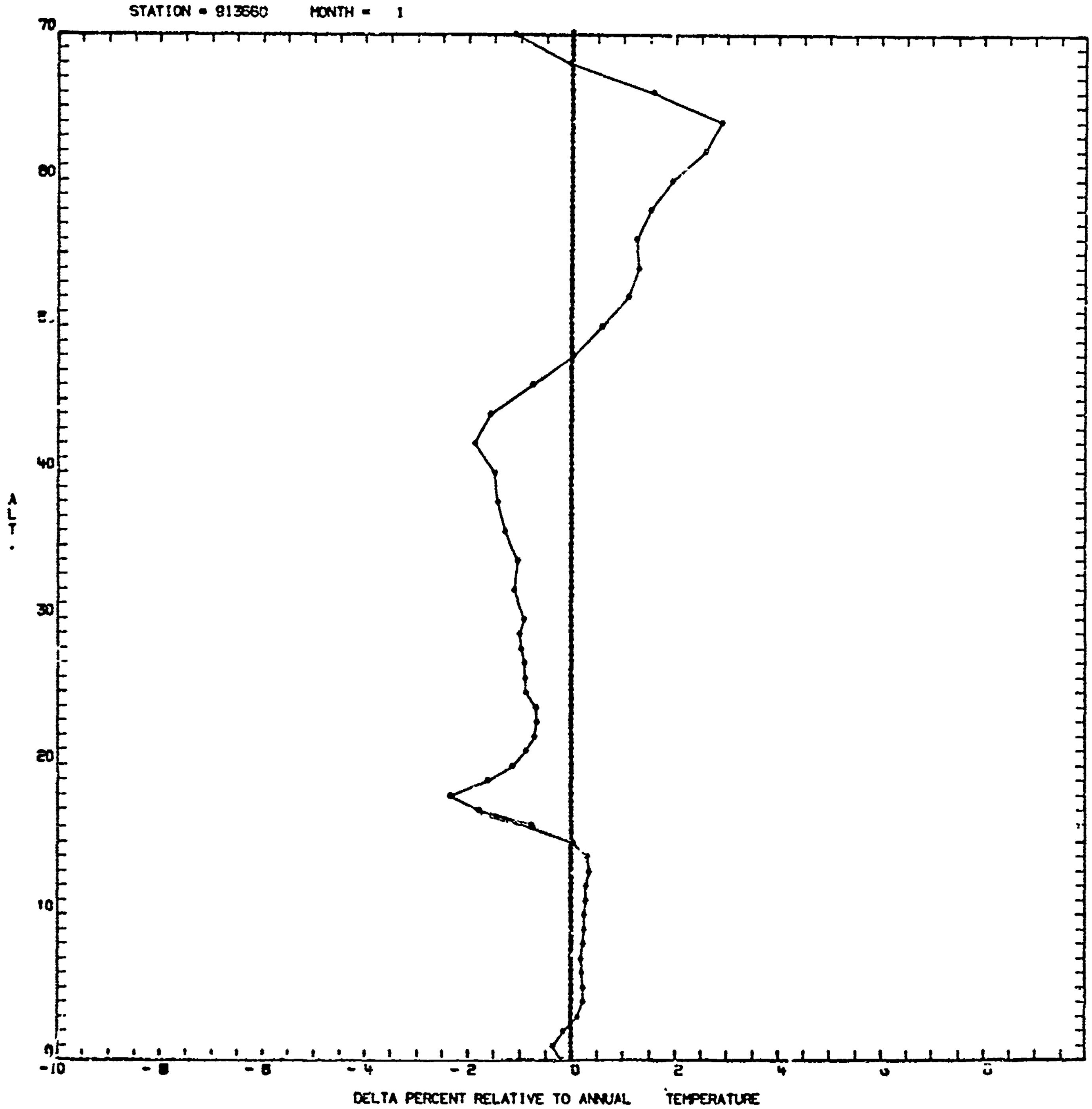

STATION = 913660 MONTH = 1
ALT.
DELTA PERCENT RELATIVE TO ANNUAL DENSITY
70
60
50
40
30
20
10
0
-10
-8
-6
-4
-2
0
2
4
6
8

Figure B2.



STATION = 813660 MONTH = 1
70
60
50
40
30
20
10
0
ALT.
-10
-8
-6
-4
-2
0
2
4
DELTA PERCENT RELATIVE TO ANNUAL TEMPERATURE

Figure B3.

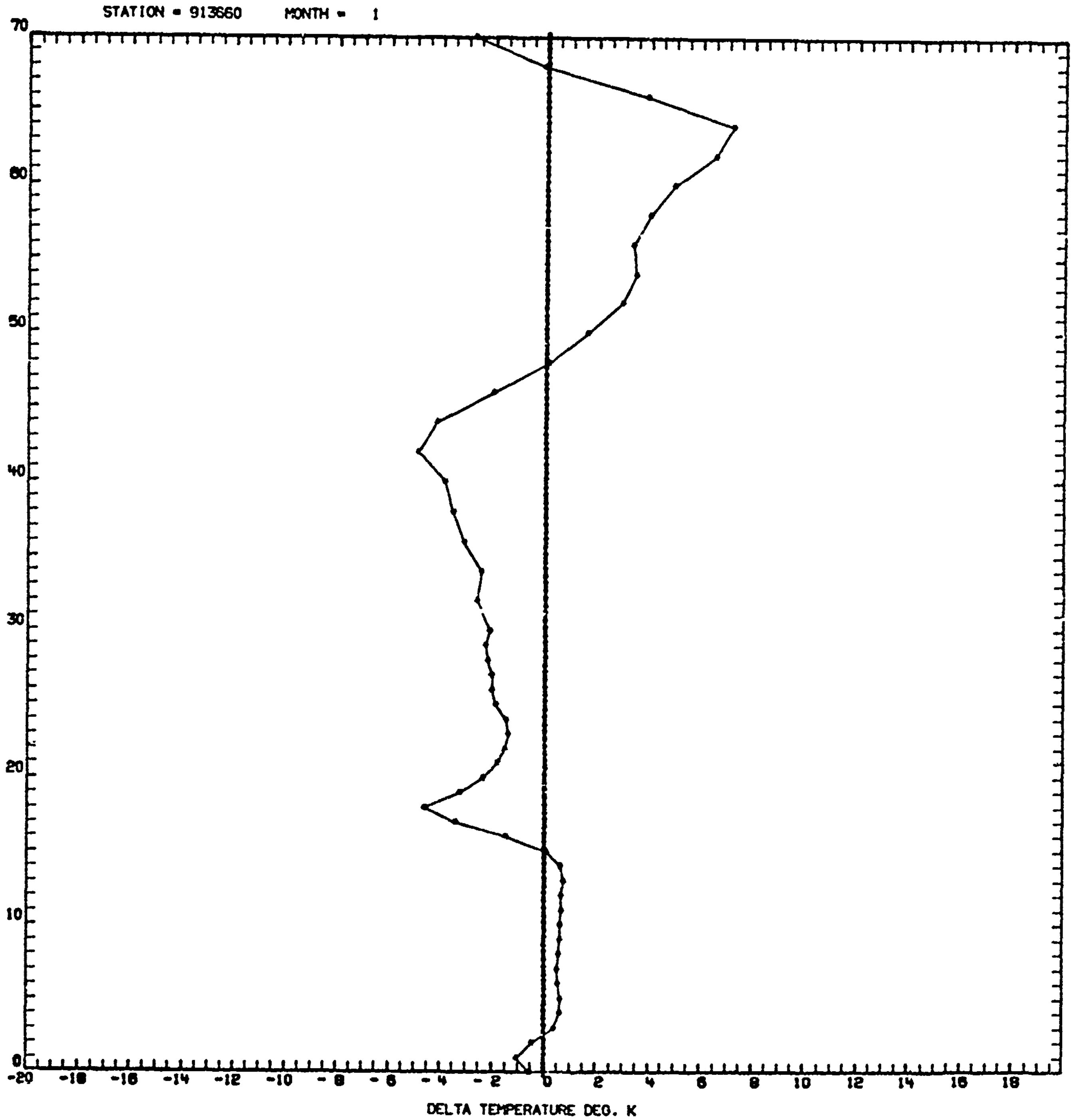


Figure B4.

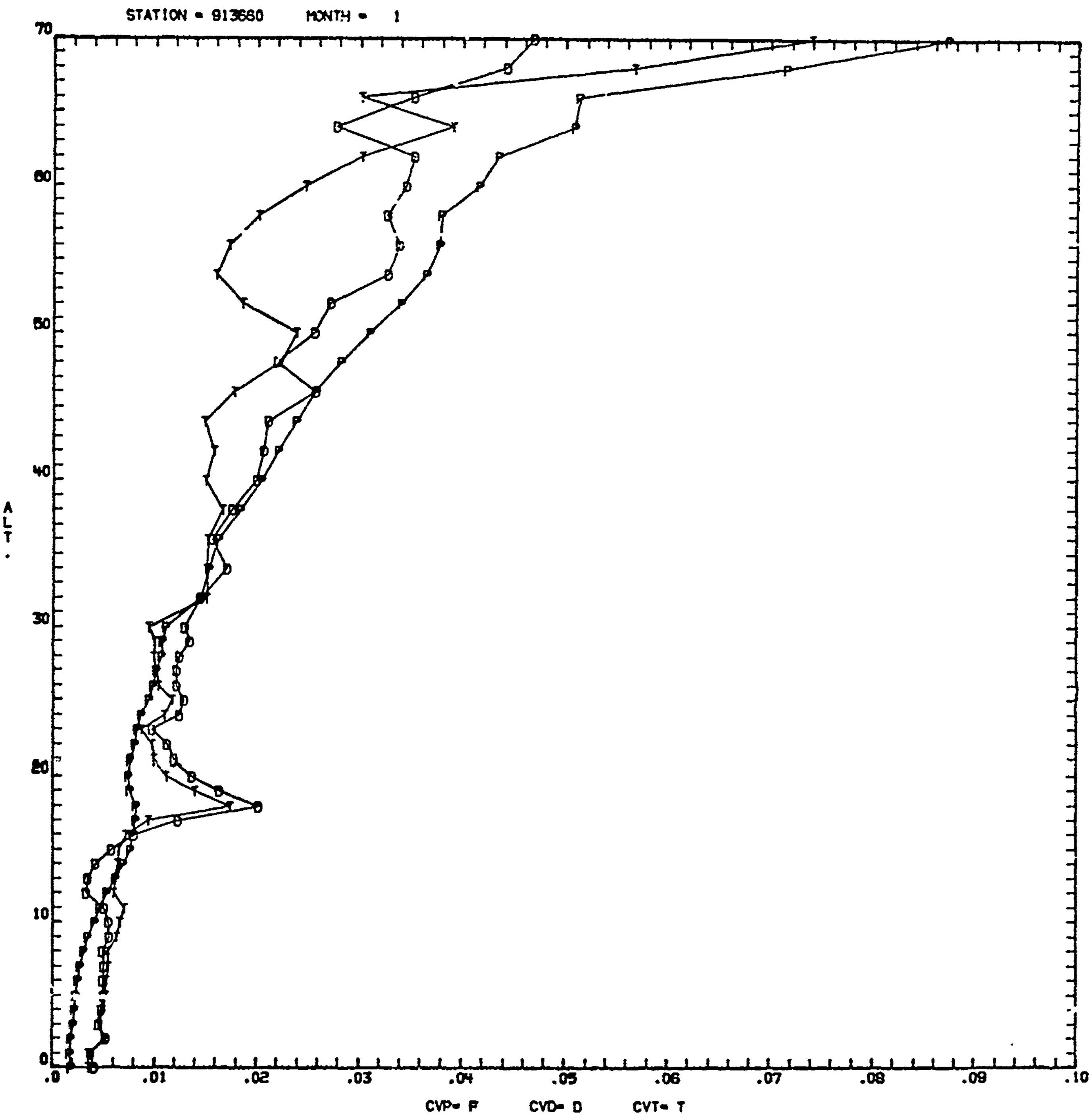
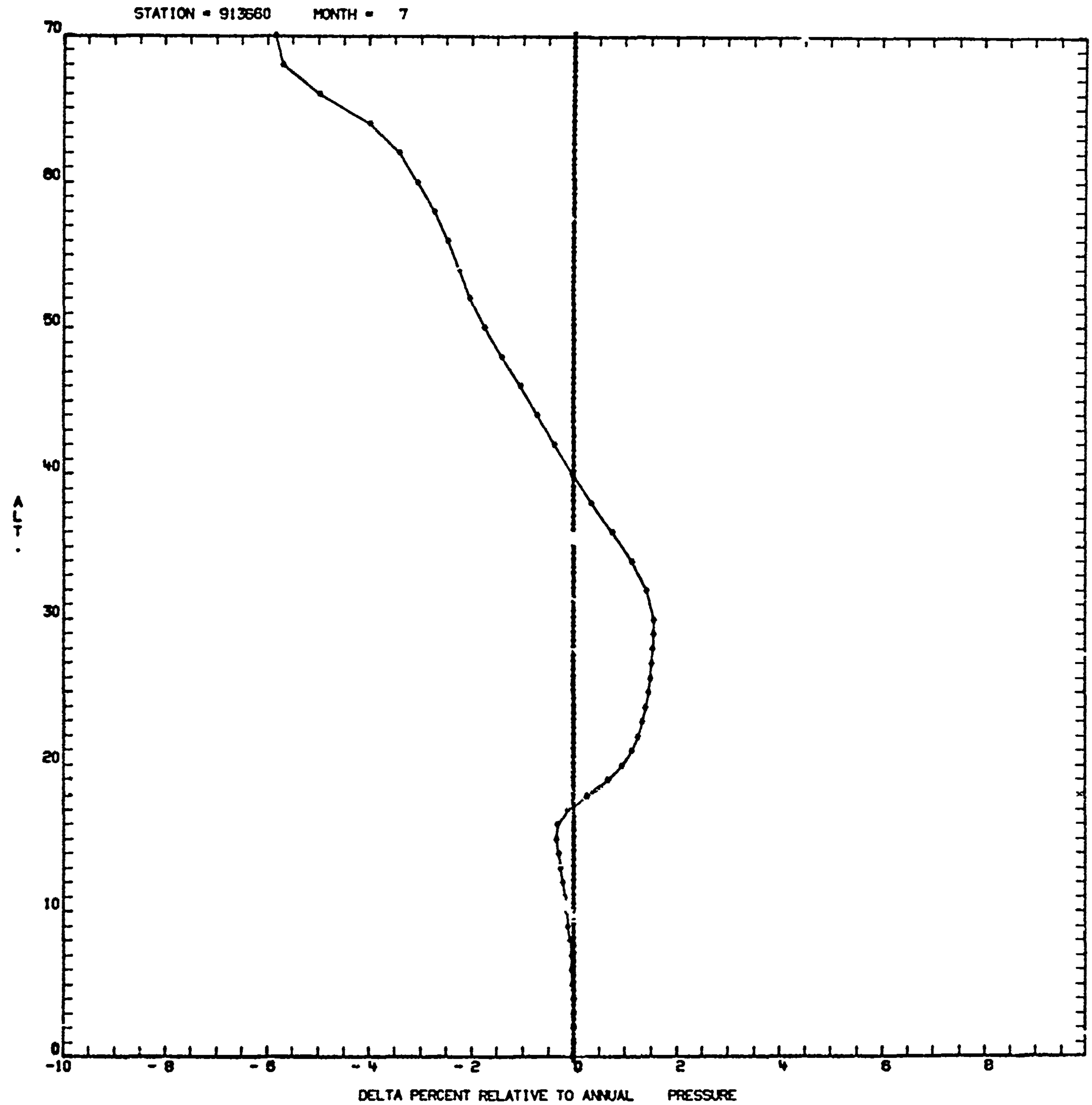

STATION = 913660 MONTH = 1
ALT.
CVP= P CVD= D CVT= T
.0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.10
0
10
20
30
40
50
60
70

Figure B5.



STATION = 913660 MONTH = 7
70
60
50
40
30
20
10
0
ALT.
-10
-8
-6
-4
-2
0
2
4
6
8
DELTA PERCENT RELATIVE TO ANNUAL PRESSURE

Figure B6.

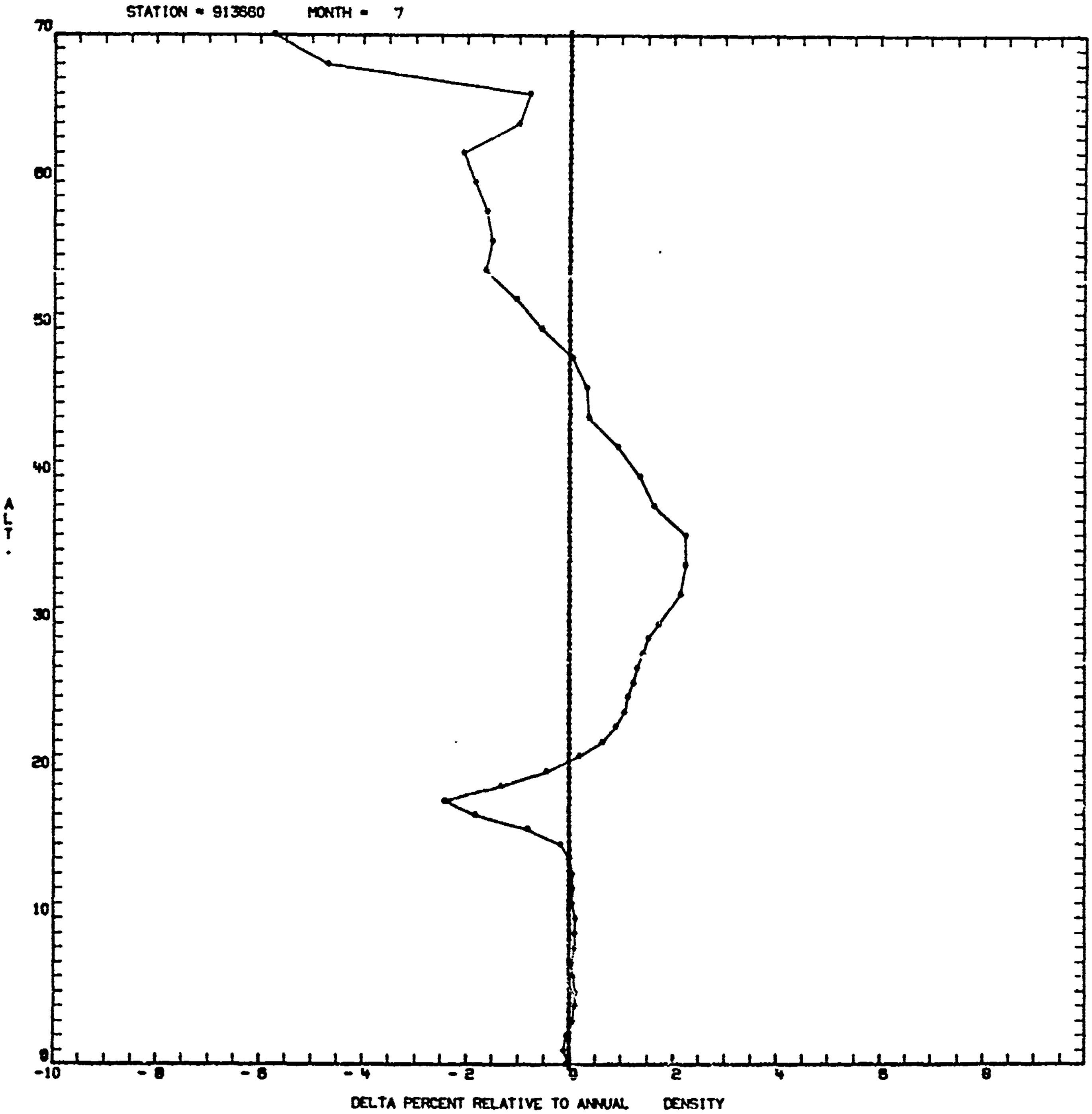
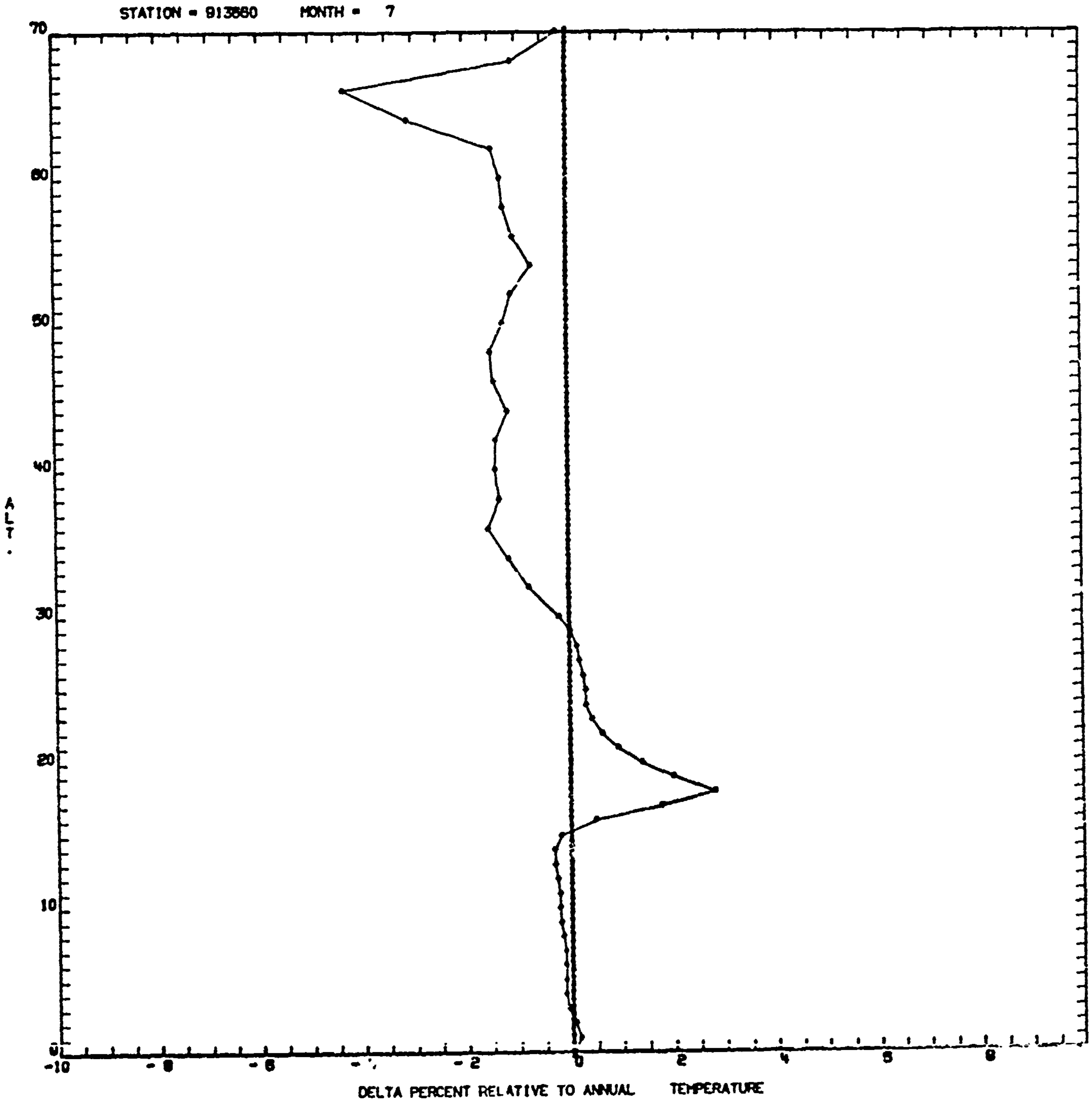
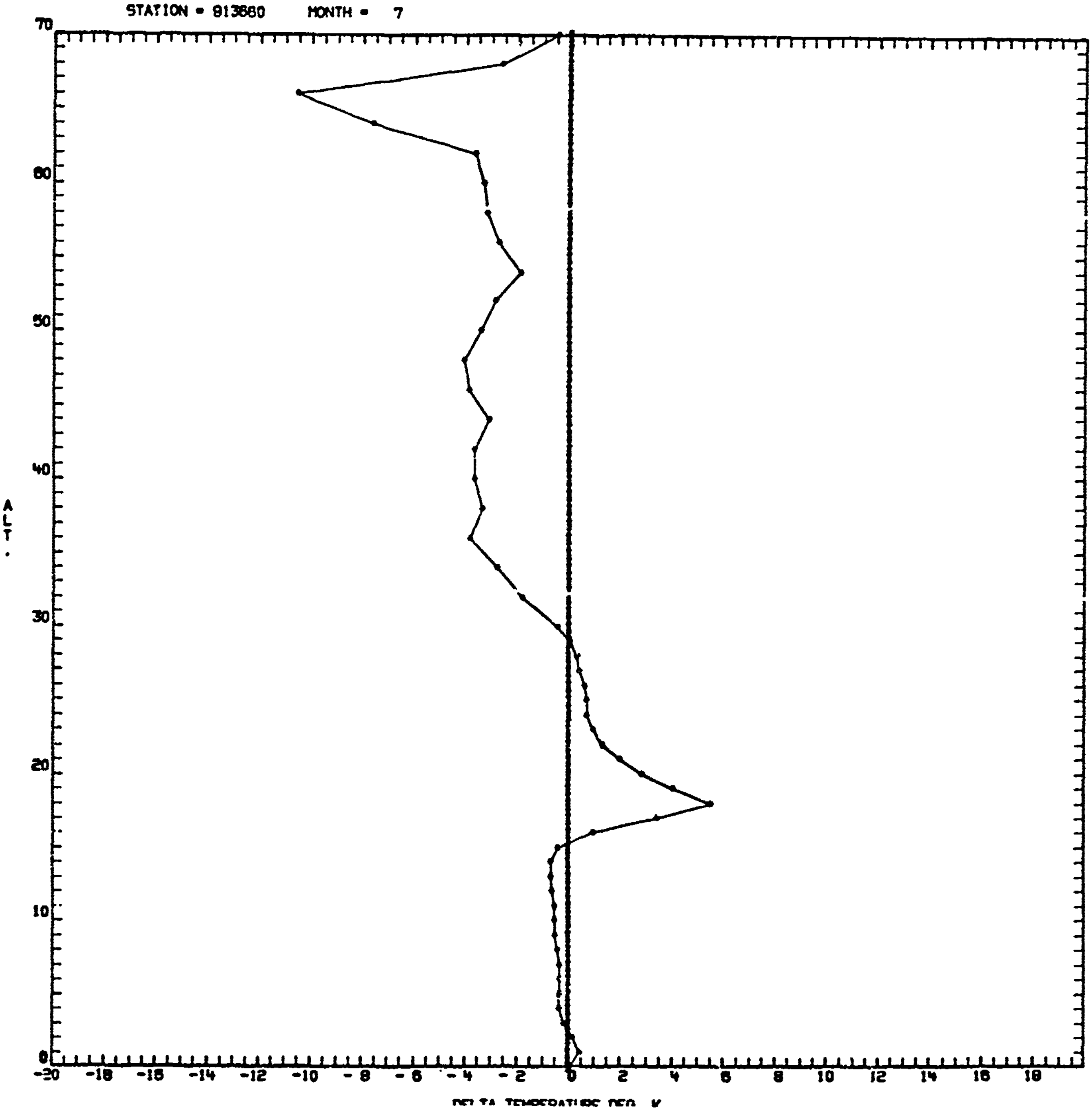

STATION = 913660 MONTH = 7
ALT.
DELTA PERCENT RELATIVE TO ANNUAL DENSITY

Figure B7.



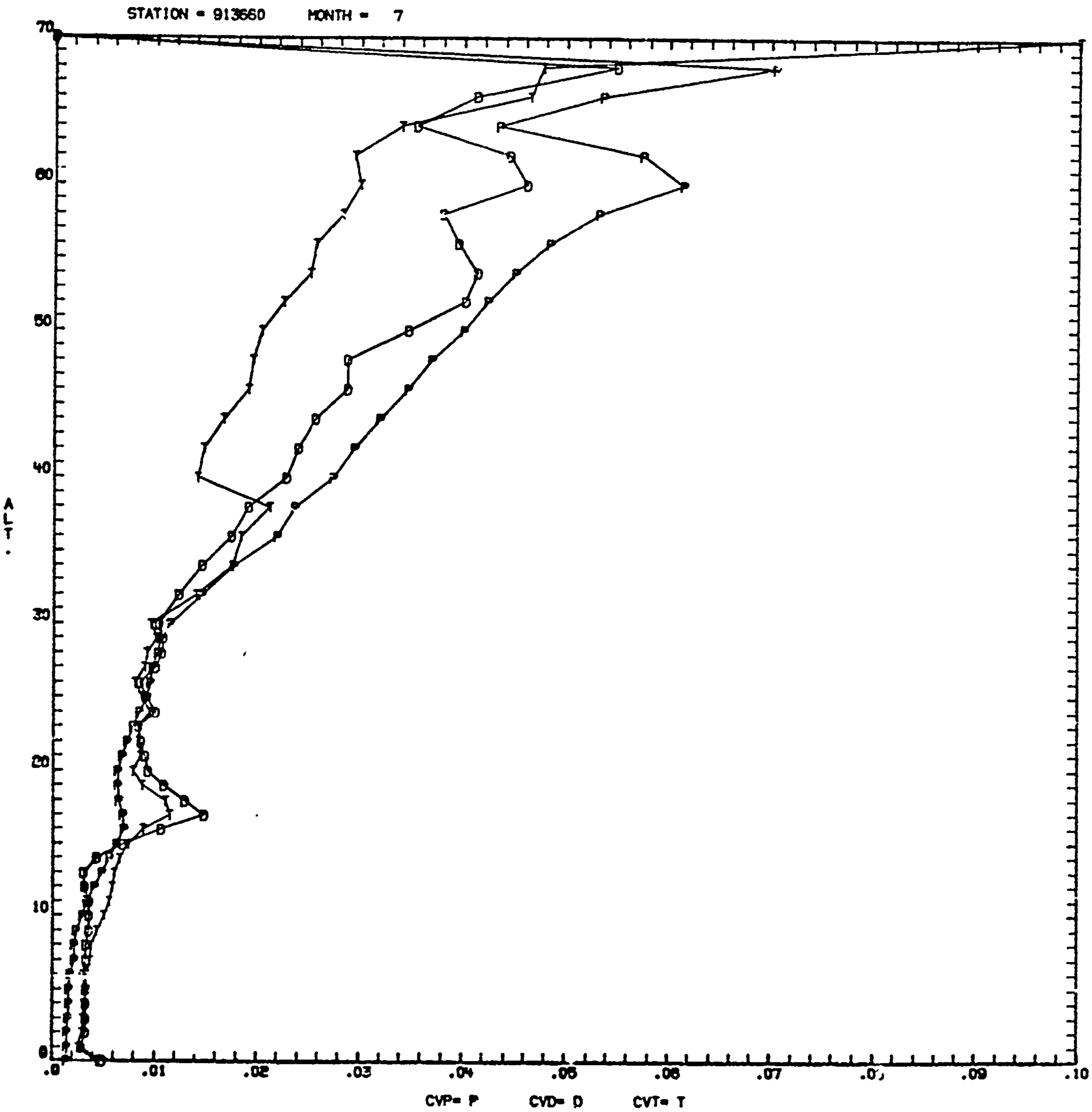
STATION = 913880 MONTH = 7
ALT.
DELTA PERCENT RELATIVE TO ANNUAL TEMPERATURE

Figure B8.



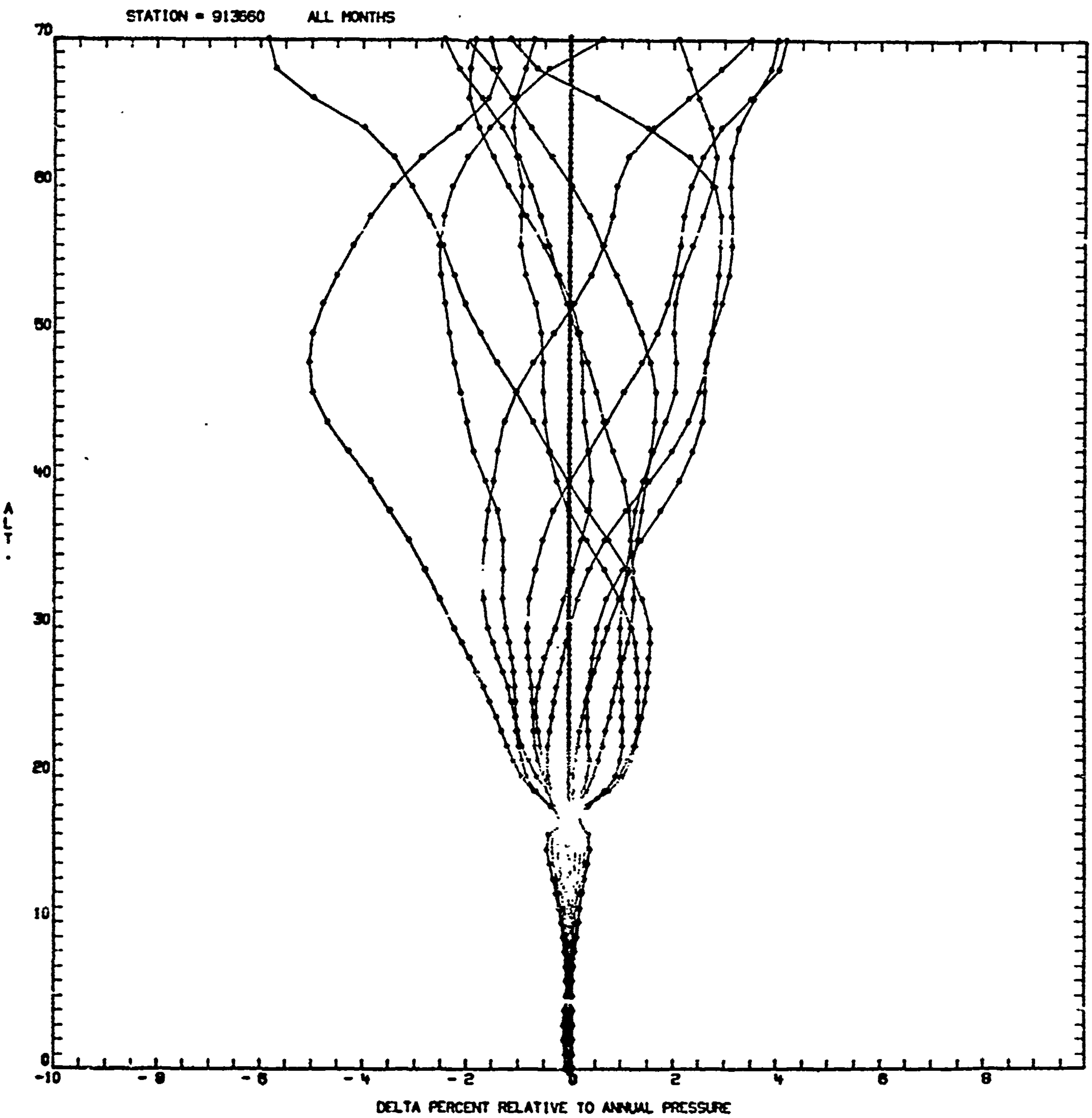
STATION = 913660 MONTH = 7
ALT.
70
60
50
40
30
20
10
0
-20 -18 -16 -14 -12 -10 -8 -6 -4 -2 0 2 4 6 8 10 12 14 16 18

Figure B9.



STATION = 913660 MONTH = 7
ALT.
70
60
50
40
30
20
10
0
.0
.01
.02
.03
.04
.05
.06
.07
.09
.10
CVP= P CVD= D CVT= T

Figure B10.



STATION = 913660 ALL MONTHS
ALT.
70
60
50
40
30
20
10
0
-10
-8
-6
-4
-2
0
2
4
6
8
DELTA PERCENT RELATIVE TO ANNUAL PRESSURE

Figure B11.

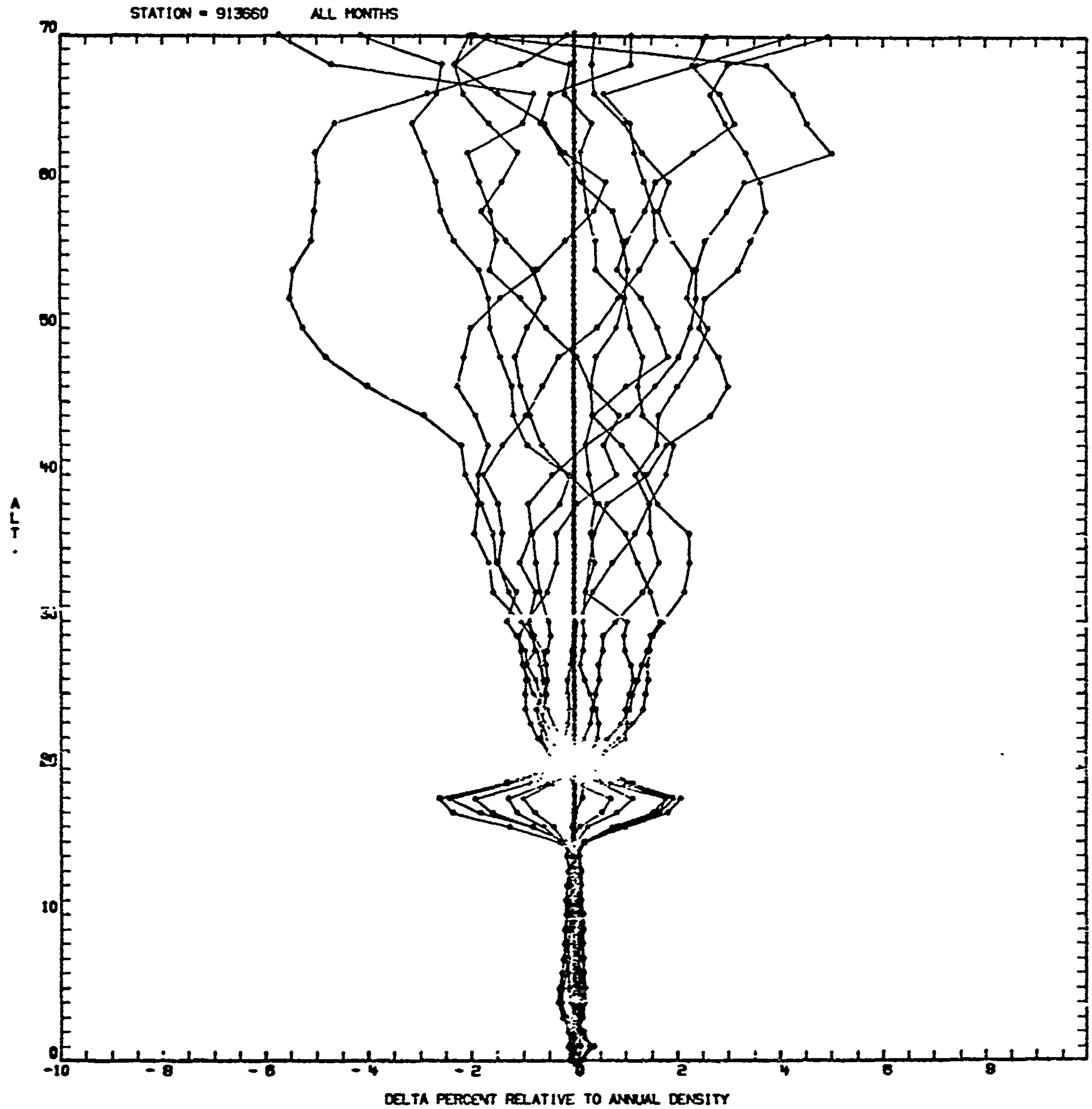

STATION = 913660 ALL MONTHS
70
60
50
40
30
20
10
0
ALT.
-10
-8
-6
-4
-2
0
2
4
6
8
DELTA PERCENT RELATIVE TO ANNUAL DENSITY

Figure B12.

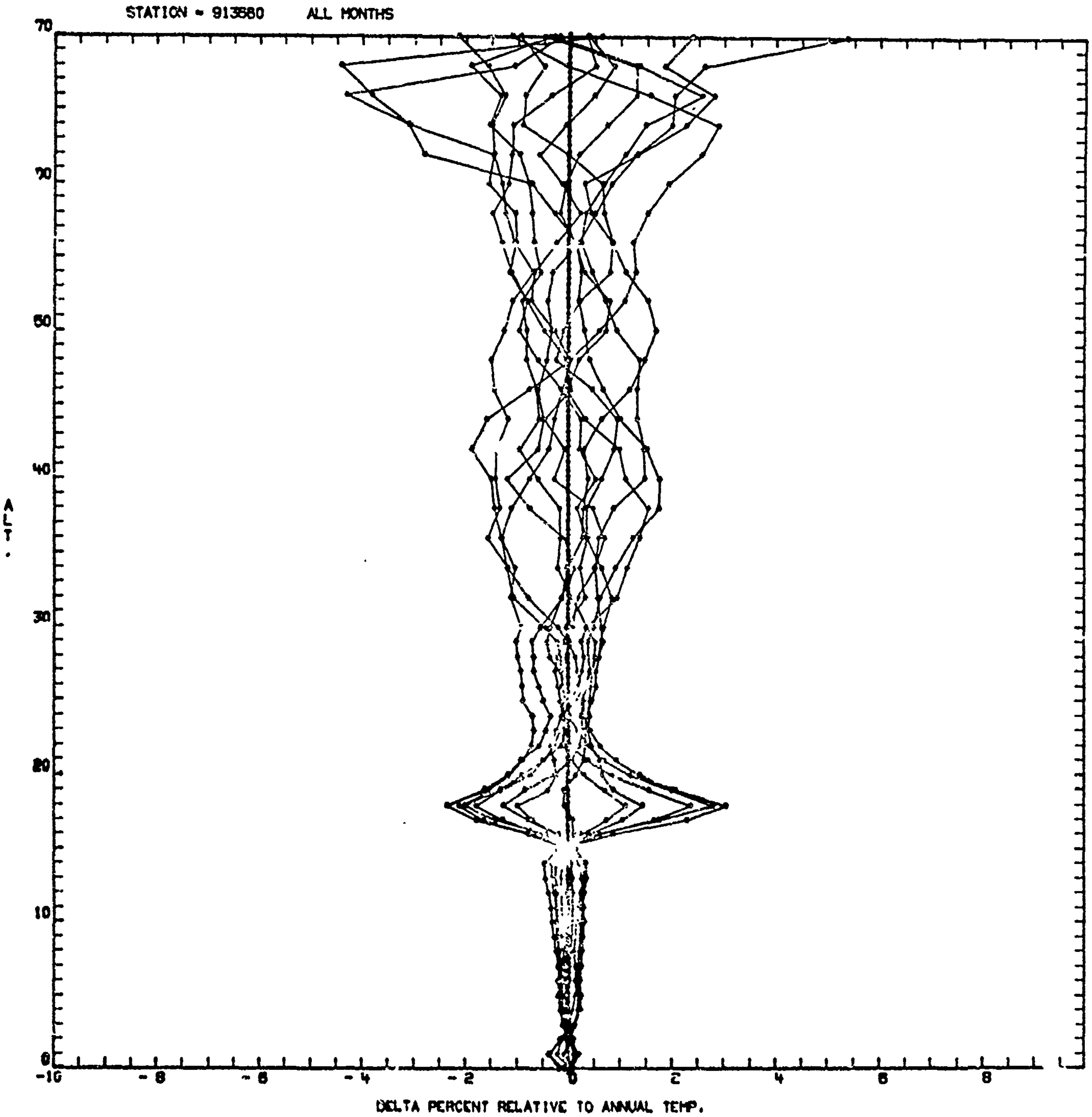

STATION = 913580 ALL MONTHS
ALT.
DELTA PERCENT RELATIVE TO ANNUAL TEMP.

Figure B.13.

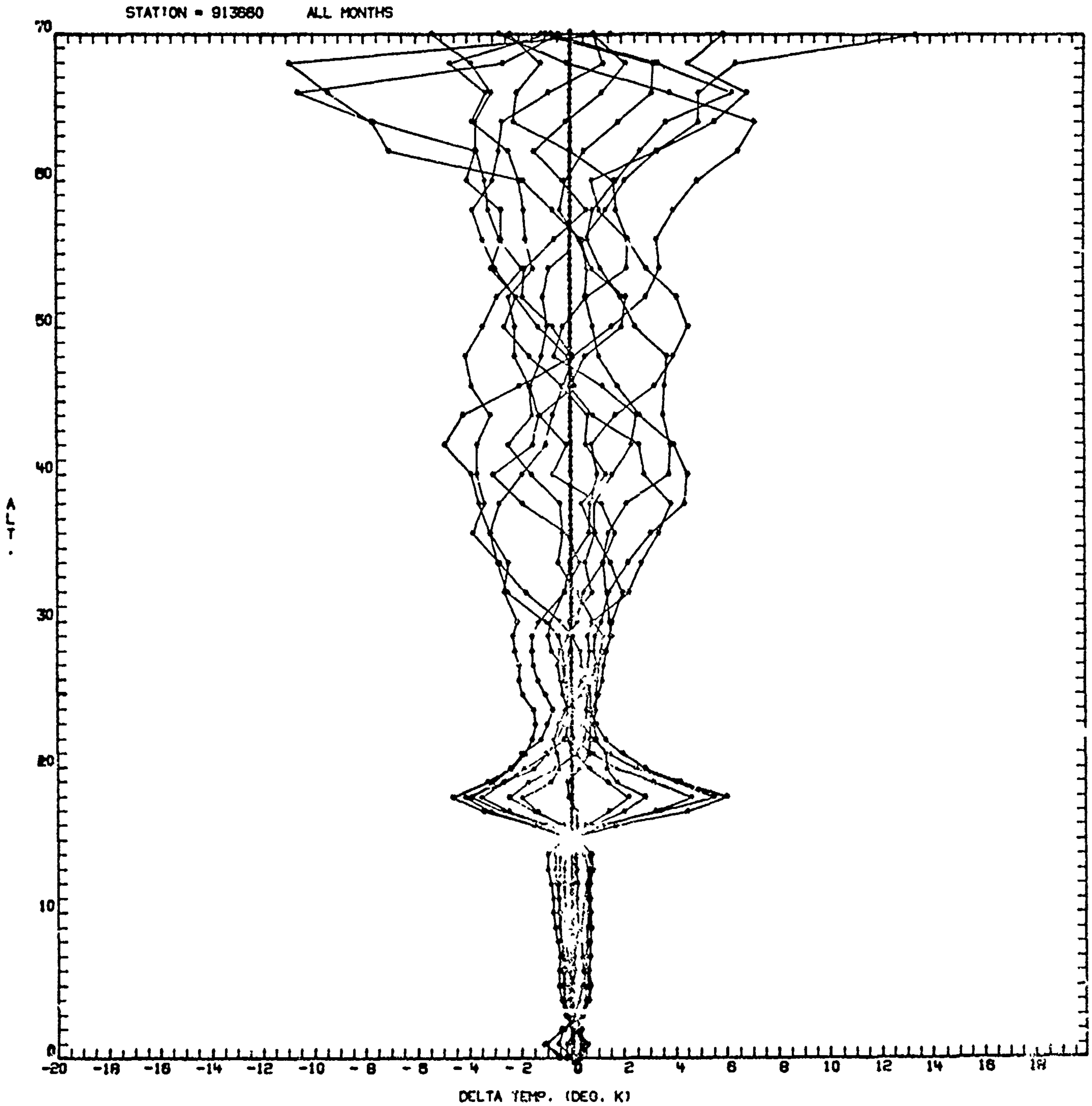

STATION = 913660 ALL MONTHS
70
60
50
40
30
20
10
0
ALT.
-20
-18
-16
-14
-12
-10
-8
-6
-4
-2
0
2
4
6
8
10
12
14
16
18
DELTA TEMP. (DEG. K)

Figure B14.

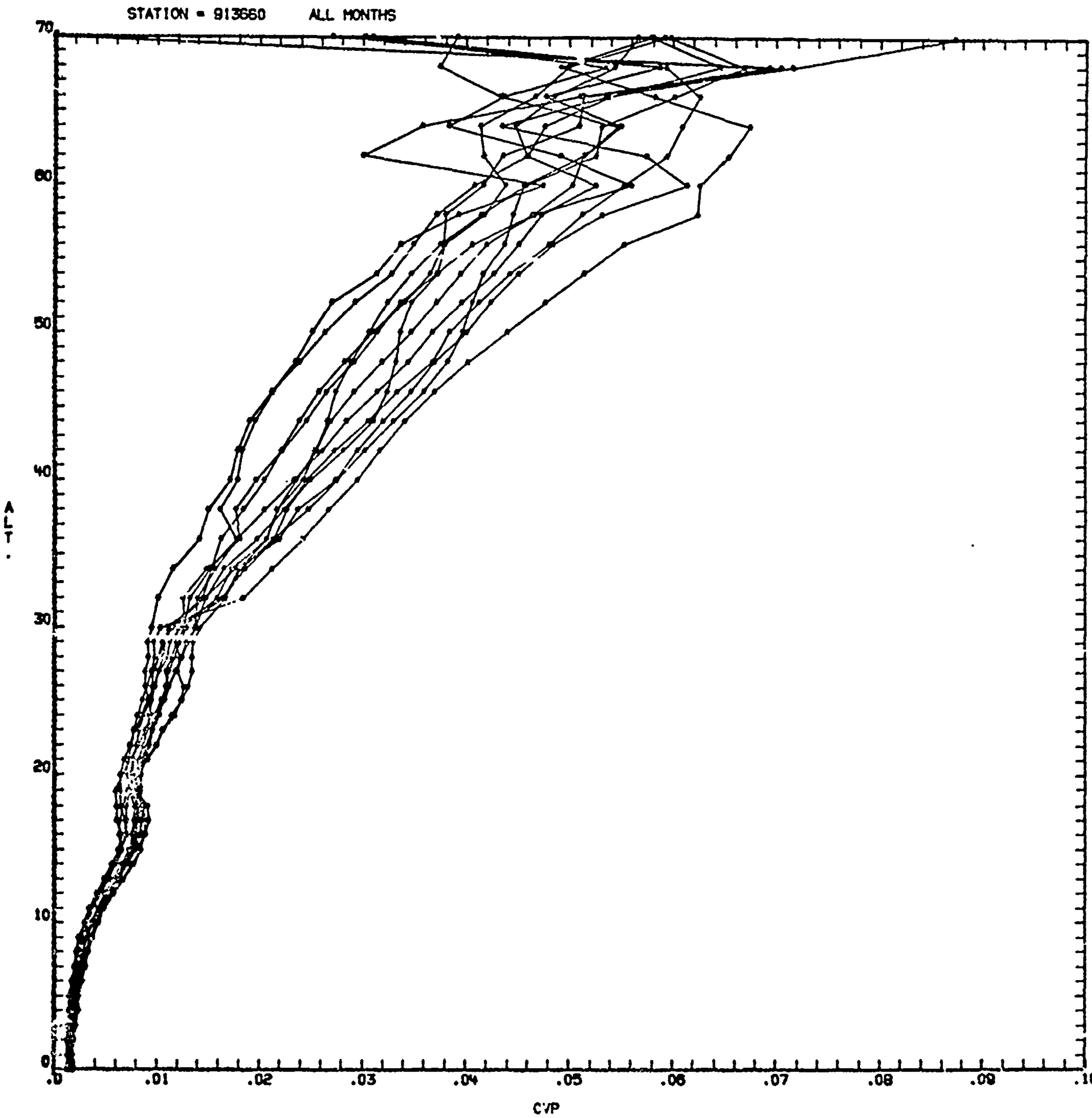
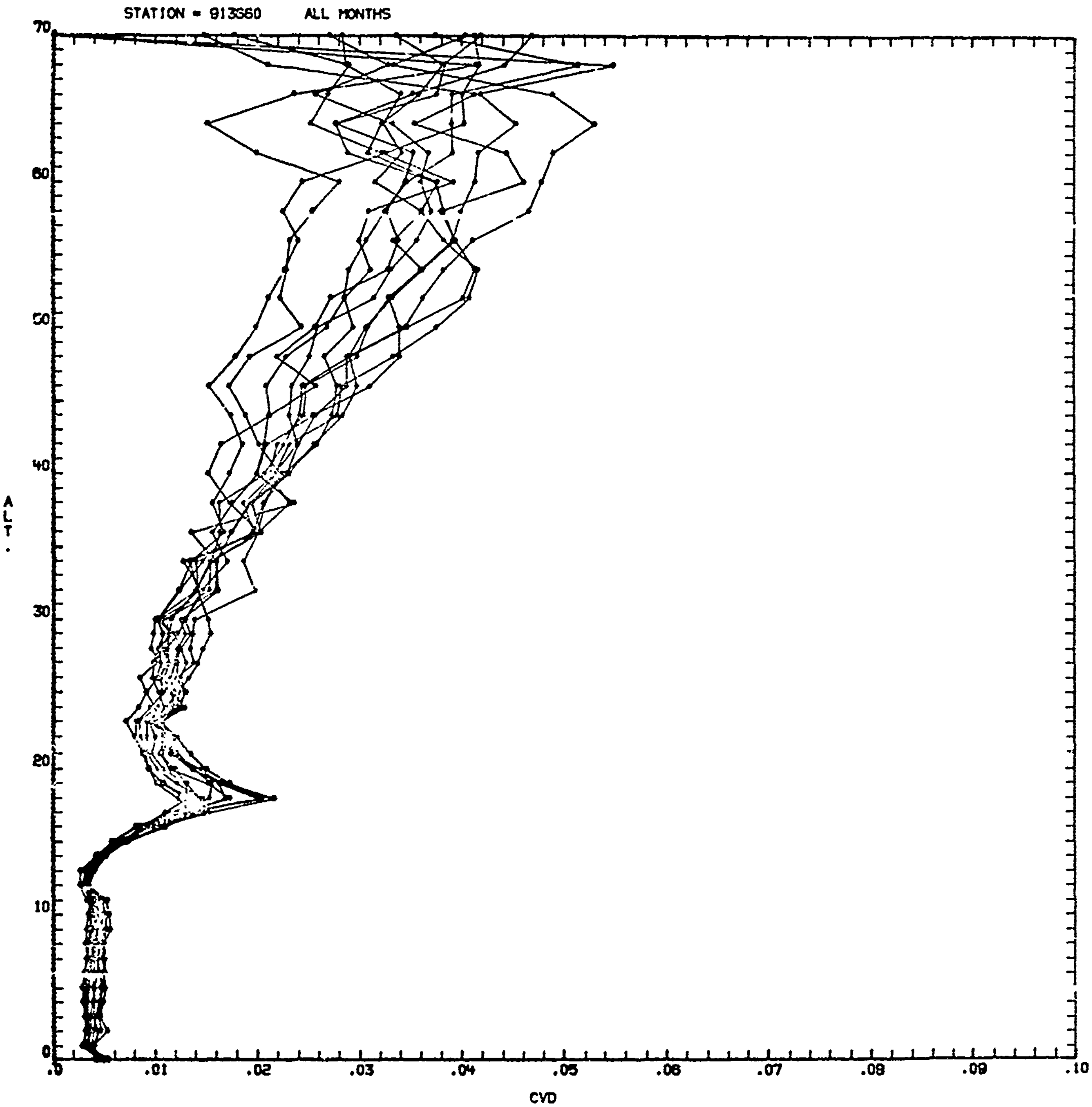

STATION = 913660 ALL MONTHS
70
60
50
40
30
20
10
0
ALT.
.0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.10
C/P

Figure B15.



STATION = 913360 ALL MONTHS
70
60
50
40
30
20
10
0
ALT.
.0
.01
.02
.03
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.05
.06
.07
.08
.09
.10
CVD

Figure B16.

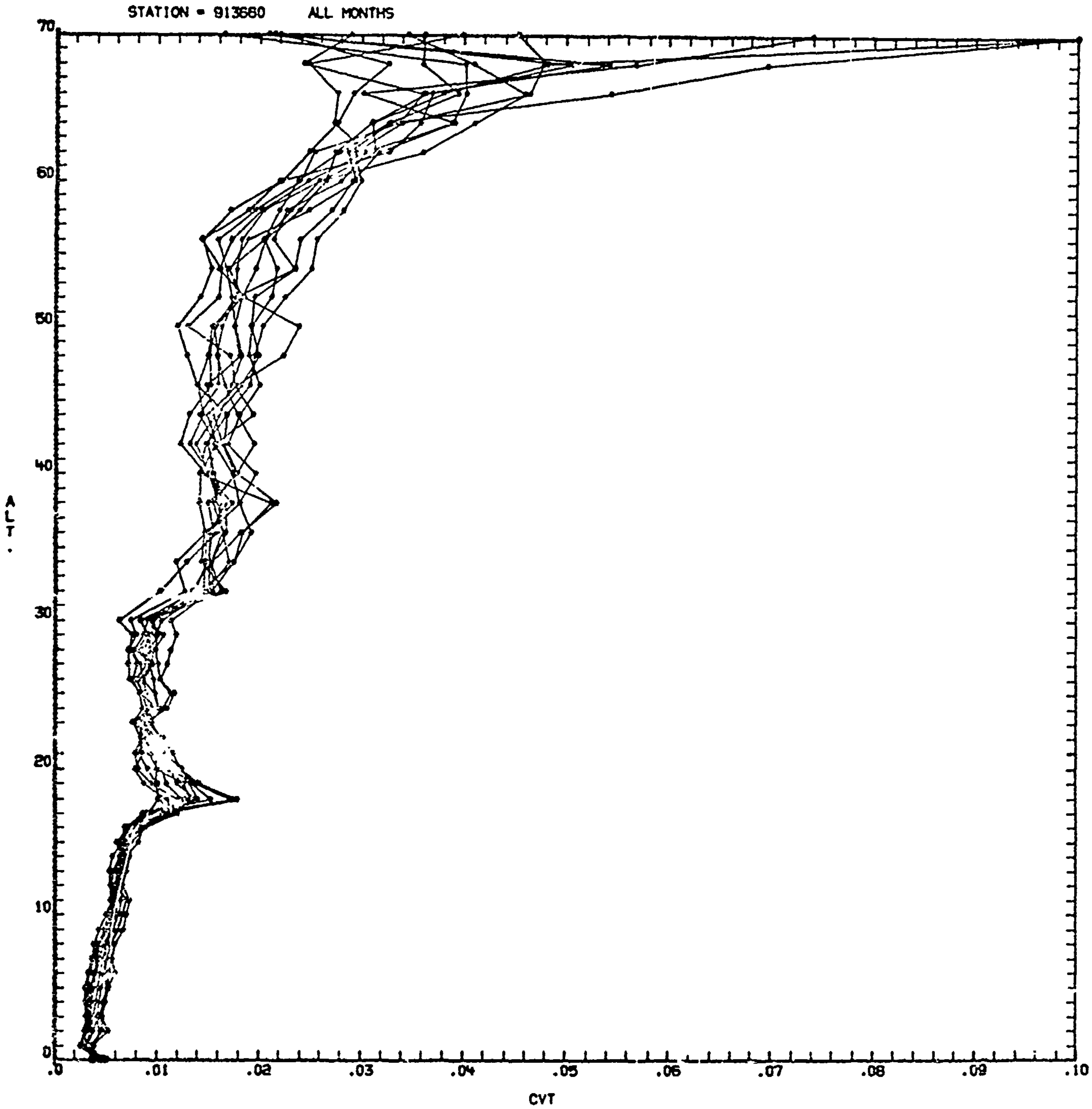
STATION = 913660 ALL MONTHS
ALT.
CVT
0
10
20
30
40
50
60
70
.0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.10

Figure B17.